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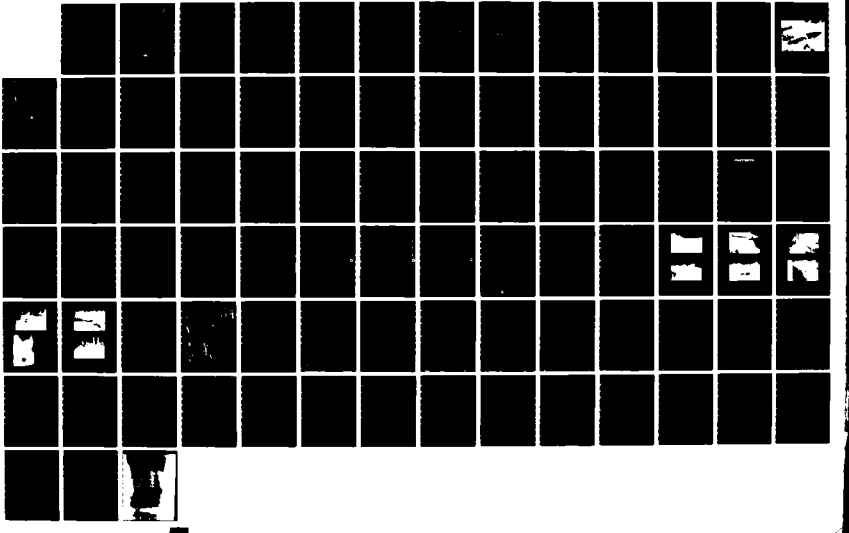

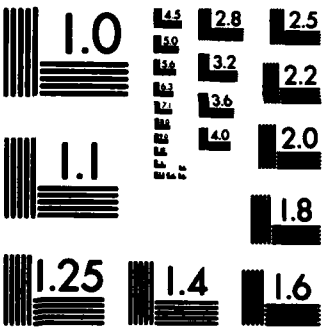

MICROCOPY RESOLUTION TEST CHART
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FARMINGTON RIVER BASIN
AVON, CONNECTICUT

UNIONVILLE RESERVOIR UPPER DAM
CT 00267

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

MARCH, 1981

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,
Farmington River Basin
Avon, Conn.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Based on the visual inspection and past operation performance, the dam is judged to be in FAIR condition. The dam of the Upper Unionville Reservoir is an earth embankment with a concrete spillway. It is approximately 220 ft. long, 23.8 ft. high and has a minimum top width of 10 ft. The dam is classified as SMALL in size and a HIGH hazard potential strucure in accordance with the Corps of Engineers. The test flood for this dam is ½ the PMF.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

NEDED

JUN 10 1981

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Unionville Reservoir Upper Dam (CT-00267) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, Town of Avon, 60 West Main Street, Avon, Connecticut 06001.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

Incl
As stated

FARMINGTON RIVER BASIN

AVON, CONNECTICUT

UNIONVILLE RESERVOIR UPPER DAM

CT 00267

PHASE 1 INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

Identification No.:	CT 00267
Name of Dam:	Unionville Reservoir Upper Dam
Town:	Avon
County and State:	Hartford, Connecticut
Stream:	Hawley Brook
Date of Inspection:	November 12, 1980

BRIEF ASSESSMENT

Based on the visual inspection and past operational performance, the dam is judged to be in FAIR condition. A wet area was noted at the downstream toe of the western embankment and there was erosion and/or settlement on the downstream face and top of the embankments. The cover of the intake tower is in fair condition and manhole steps in the intake tower are in poor condition. Access to the tower would be difficult during flood conditions.

The dam of the Upper Unionville Reservoir is an earth embankment with a concrete spillway. It is approximately 220 feet long, 23.8 feet high and has a minimum top width of 10 feet. The Unionville Reservoir Upper Dam was probably constructed in 1909. The Town of Avon presently owns and operates the dam and appurtenant structures. The dam is presently used for passive recreation and to fill the lower pond which is used for swimming.

The dam is classified as SMALL in size and a HIGH hazard potential structure in accordance with the Recommended Guidelines for Safety Inspection of Dams, established by the Corps of Engineers. The impoundment storage at the top of the dam is 18 ac.-ft. and the maximum height of the dam is 23.8 feet. Failure of the dam would result in the loss of more than a few lives and damage to two homes. The depth of inundation at these homes would be 0 feet before and 2 to 3 feet after dam failure.

The test flood for this dam is 1/2 the Probable Maximum Flood (PMF). The test flood has an inflow equal to 1020 cfs and an outflow discharge equal to 1020 cfs with a stillwater elevation of 397.2 which will overtop the dam by 0.9 feet.

The maximum outflow capacity of the spillway with the water surface at the top of the dam is 100 cfs, which is 10 percent of the test flood outflow.

It is recommended that the following items be studied further by a qualified registered engineer: The inability of the spillway to pass the test flood without overtopping the dam, providing access to the intake tower, the repair or replacement of the cover and steps of the intake tower, the repair or replacement of the leaking 6 inch valve, the removal of trees on the embankments, and monitoring of possible seepage at the downstream toe of the western embankment.

The following remedial measures should be taken by the owner: Removal of brush on the embankments, repair of eroded areas on the embankments, repair of spalled concrete on the spillway, development of a downstream warning plan and an annual inspection program.

Recommendations and remedial measures that should be implemented within one year of receipt of this Phase I Inspection Report are further described in Section 7.

JAMES P. PURCELL ASSOCIATES, INC.

Sudhir A. Shah, P.E.
Director of Engineering
Connecticut P.E. No. 8012

This Phase I Inspection Report on Unionville Reservoir Upper Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, MEMBER
Geotechmical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation. However, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there by any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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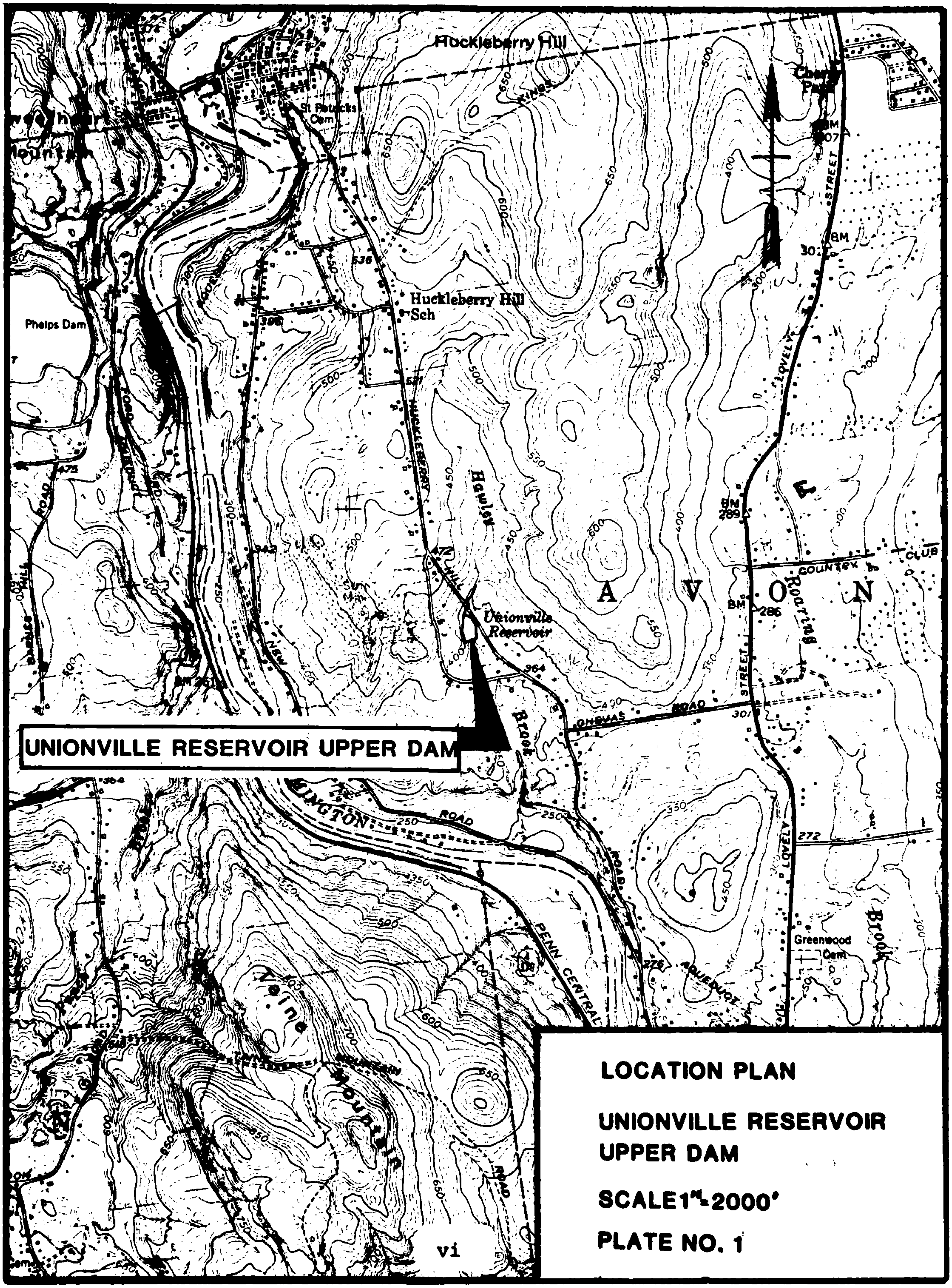
APPENDICES

OVERVIEW PHOTO - UNIONVILLE RESERVOIR UPPER DAM

PHOTO TAKEN DECEMBER 15, 1980



LOCATION PLAN

UNIONVILLE RESERVOIR UPPER DAM

SCALE 1"=2000'

PLATE NO. 1

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

NAME OF DAM: UNIONVILLE RESERVOIR UPPER DAM

SECTION 1

PROJECT INFORMATION

1.1 General:

a. Authority:

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army through the Corps of Engineers to initiate a national program of dam inspections throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. James P. Purcell Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to James P. Purcell Associates, Inc., under a letter from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-C-0009 has been assigned by the Corps of Engineers for this work.

b. Purpose:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.

2. Encourage and prepare the States to initiate quickly, effective dam safety programs for non-federal dams.

3. To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location:

The Unionville Reservoir Upper Dam is located in the Town of Avon, Hartford County, Connecticut, approximately 2 miles northeast of Unionville, Connecticut (See Plate No. 1). The dam impounds water from Hawley Brook and is located approximately 3600 feet upstream of the confluence with the Farmington River.

The impoundment is situated in a north/south direction with the dam located at the southern end. The dam is located at latitude 41°-47'-09.3" and longitude 72°54'-33.8".

The dam is located adjacent to Countryside Park and is also known as the Countryside Park Upper Dam.

All elevations used in this report are based on the National Geodetic Vertical Datum (NGVD).

b. Description of Dam and Appurtenances:

The dam is an earth embankment with a concrete spillway section in the center. The dam is approximately 220 feet long, 23.75 feet high with a minimum top width of 10 feet. The concrete spillway section is stepped on the downstream face with a batter of approximately 1H:2.5V. The earth embankment has a slope of approximately 2H:1V. The downstream face of the western embankment is heavily vegetated with brush, grass and a few trees. There is minor brush growth on the faces of the eastern embankment.

The spillway is located in the center of the dam and is 27 feet long. It is 1.25 feet below the top of the dam and is 4 feet wide.

The outlet works consist of a single 16 inch pipe through the spillway section from a concrete intake tower 4 feet upstream of the dam. Various inlet pipes and valves control discharge into the tower and then into the 16 inch pipe. (See plan of intake tower, Page B-10.) Water may also be drawn directly from the pond via the 16 inch pipe.

c. Size Classification:

The size classification of this dam is SMALL as per the criteria set forth in the Recommended Guidelines for Safety Inspection of Dams by the Corps of Engineers. The impoundment storage at the top of the dam is 18 ac.-ft. (range 50 to 1000 ac.-ft.) and the maximum height of the dam is 23.75 feet. (range of 25 to 40 feet). The size classification is based on both the height and storage criteria.

d. Hazard Classification:

The hazard classification of this dam is HIGH as per the criteria set forth in the Recommended Guidelines for Safety Inspection of Dams, by the Corps of Engineers. The dam is located upstream of the Unionville Reservoir Lower Dam, Edwards Road, New Road, and two homes where failure discharge may cause the loss of more than a few lives, and cause damage due to high velocity impact from debris and flooding. The estimated water depth due to the assumed dam failure may range from 23 feet at the dam to 1.0 foot, 3600 feet downstream at the Farmington River.

The two homes are located approximately 900 feet downstream of the dam. The depth of inundation at these homes would be 0 feet before and 2 to 3 feet after dam failure.

e. Ownership:

The Unionville Reservoir is presently owned by the Town of Avon, 60 West Main Street, Avon, Connecticut 06001. Prior to April 1967, the dam was owned by the Unionville Water Company.

f. Operator:

The operator and caretaker of the dam is:

Mr. Edward S. Pease
Public Works Department, Building and Grounds
Town of Avon
11 Arch Street
Avon, Connecticut 06001
Telephone: (203) 673-6151 (Office)
Telephone: (203) 673-2170 (Home)

g. Purpose:

Originally built for water supply, it is presently used for passive recreation and to fill the lower pond which is used for swimming.

h. Design and Construction History:

The date 1909 is formed on the western wingwall and is probably the date of construction. The bridge over the spillway was added in 1968.

i. Normal Operational Procedure:

All flow is discharged over the spillway. The outlet pipe has been opened periodically to fill the lower pond.

1.3 Pertinent Data:

a. Drainage Area:

The drainage basin is generally rectangular in shape with a length of 1.5 miles and an average width of 0.6 miles resulting in a total drainage area of 0.9 square miles (see drainage basin map in Appendix D). The topography is generally moderate to steep terrain, with elevations ranging from a high of 730 feet to a low of 395 feet at the spillway crest. Stream and basin slopes are steep, 3 percent and 15 percent, respectively. The reservoir has a normal surface area of 1.5 acres which is 0.3 percent of the watershed.

b. Discharge at Dam Site:

There are no specific discharge records available for this dam. Listed below are calculated discharge values for the spillway and outlet works (16 inch blowoff pipe):

1. Outlet works: A 16 inch blowoff with an intake at approximately 375 and a discharge capacity of 30 cfs at elevation 396.3.

2. Maximum known flood at dam site: Unknown.

3. Ungated spillway capacity at top of dam: 100 cfs at elevation 396.3.

4. Ungated Spillway capacity at test flood elevation: 225 cfs at elevation 397.2.

5. Gated spillway capacity at normal pool elevation: N/A.

6. Gated spillway capacity at test flood elevation: N/A.

7. Total spillway capacity at test flood elevation: 225 cfs at elevation 397.2.

8. Total project discharge at top of dam: 130 cfs at elevation 396.3.

9. Total project discharge at test flood level: 1020 cfs at elevation 397.15.

c. Elevation (Feet above NGVD):

1.	Stream bed at toe of dam	372.5
2.	Bottom of cutoff	N/A
3.	Maximum tailwater	Unknown

4.	Normal pool	395.0
5.	Full flood control pool	N/A
6.	Spillway crest	395.0
7.	Design surcharge (original design)	Unknown
8.	Top of dam	396.3
9.	Test flood level	397.2

d. **Reservoir (Length in feet):**

1.	Normal pool	400
2.	Flood control pool	N/A
3.	Spillway crest pool	400
4.	Top of dam	425
5.	Test flood pool	450

e. **Storage (acre-feet):**

1.	Normal pool	16
2.	Flood control pool	N/A
3.	Spillway crest pool	16
4.	Top of dam	18
5.	Test flood pool	20

f. **Reservoir Surface (acres):**

1.	Normal pool	1.5
2.	Flood control pool	N/A
3.	Spillway crest	1.5
4.	Test flood pool	2.2
5.	Top of dam	1.9

g. **Dam:**

1.	Type	Earth Embankment
2.	Length	220 feet
3.	Height	23.8 feet
4.	Top width	10 feet minimum
5.	Side slopes	Upstream - Unknown Downstream - 2H:1V
6.	Zoning	Unknown
7.	Impervious core	Unknown, Core is suspected.
8.	Cutoff	Unknown
9.	Grout curtain	Unknown
10.	Other	---

h. **Diversion and Regulating Tunnel:** N/A

i. **Spillway:**

1.	Type	Overflow, broad crested uncontrolled weir
2.	Length of weir	27.0 feet
3.	Crest elevation	395.0
4.	Gates	None
5.	U/S Channel	Natural bed
6.	D/S Channel	Pond of lower dam
7.	General	---

j. **Regulating Outlets:**

Refer to Paragraph 1.2b - "Description of Dam and Appurtenances" for description of Outlet Works.

1.	Inverts and size	16 inch pipe - 375 feet
2.	Description	Cast iron pipes
3.	Control mechanisms	Hand operated gate valves within concrete intake tower.
4.	Other	Refer to Page B-10 for a plan of the intake tower.

SECTION 2

ENGINEERING DATA

2.1 Design:

There are no available records presenting design information for the construction of the dam.

All data concerning the dam was destroyed during the 1955 flooding of the Unionville Water Company offices.

2.2 Construction:

There are no available records of the construction of this dam.

2.3 Operation:

No formal records of operation are kept for this facility.

2.4 Evaluation:

a. Availability:

Limited information for this facility is available in the files of the Department of Environmental Protection, Water Resources Unit, Dam Safety Engineers, State Office Building, Hartford, Connecticut.

b. Adequacy:

The lack of engineering data did not allow a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based on the visual inspection, the dam's past performance, and sound engineering judgment.

c. Validity:

N/A

SECTION 3

VISUAL INSPECTION

3.1 Findings:

a. General:

The visual inspection of the Unionville Reservoir Upper Dam was conducted on November 12, 1980 and a copy of the visual inspection check list is contained in Appendix A of this report.

The following procedure was used:

1. Inspection of the upstream area of the reservoir which is impounded by the dam.

2. Visual inspection of the face and top of the dam and spillway for cracks, loose stones, seepage, etc.

3. Inspection of the outlet works and other appurtenances as to their existence, location, and operability.

4. Review of procedures that could be utilized in the event of an emergency situation.

5. A check of the downstream area for seepage, piping, boils or other indications of abnormal conditions. The downstream hazard potential in the event of dam failure was investigated.

Before the inspection, the available existing data and mapping were studied and reviewed.

b. Dam:

1. Top of Dam: The dam consists of an earth embankment with a minimum top width of 10 feet. The grassed top of dam has settled up to one foot on both sides of what is suspected to be a core wall. This settlement may be due to pedestrian traffic. The dam ties into a natural slope to the west and extends to a flat picnic area to the east (Photo C-9). The suspected core wall appears to extend into this picnic area. There are several trees at the point where the west embankment ties into the side slope (Photo C-10).

2. Upstream Face: The upstream face above the water level is vegetated with grass on the east side and brush on the west side (Photo C-2). The water level on the date of inspection was 15 inches below the top of the dam.

3. Downstream Face: The downstream face is an earth embankment with a slope of 2H:1V (Photo C-1). There is a low wet area at the toe of the west face which is continuously damp. (See Plan - Page B-7.) The quantity or clarity of the seepage could not be determined because there was no visible flow at the time of inspection. The Assistant Town Engineer indicated that when the lower pond was last drained, there was also seepage all along the base of the slope to the west of the lower pond. Thus, this seepage may be groundwater. It has remained constant for the past several years, since it has been observed.

   There are erosion areas on the downstream faces due in part to foot paths up the slopes (see Plan-Page B-7).

   The western face is vegetated with brush and small trees, and the eastern face is grassed with two large trees at the toe. There is also a stand of evergreen shrubs on the eastern face near the picnic area (Photo C-6). These shrubs may be located on natural ground.

c. **Appurtenant Structures:**

1. Spillway: The spillway is a 27 foot long, by 4 foot wide broad crested weir, located in the center of the dam. It is constructed of concrete, is stepped on the downstream face, and is contained by concrete wingwalls at both ends (Photos C-1 and C-3). There is minor spalling of the concrete on the downstream face of the spillway (Photos C-3, C-5). The spalling is minor and there is no visible reinforcing. The spillway is generally in good condition. Water was flowing over the spillway at the time of the inspection (Photos C-3 and C-5).

2. 16 Inch Blowoff: A 16 inch pipe extends from an inlet in the pond, through the concrete intake tower, and dam, to a free outlet in the downstream face of the spillway section (Photo C-3). The outlet is controlled by a gate valve within the intake tower. This valve is reportedly operational and is tested twice a year.

3. Intake Tower: The intake tower is a square concrete structure which contains the valves for the 16 inch blowoff and various other pipes (Photos C-7 and C-8). Two 12 inch pipes enter the tower at different levels in addition to the blowoff. A 6 inch pipe extends through the tower and joins the blowoff prior to the dam. The valve controlling this 6 inch pipe is leaking water into the tower. A 16 inch drain is attached to the blowoff and is normally open to drain the tower. There was no excessive seepage through the concrete, and the intake tower is generally in good condition.

   All valves are reportedly operational and are tested twice a year. The wrench for the valves is kept in a house next to the lower pond.

   The tower is covered by a wood platform, which is in fair condition but should be replaced. The metal manhole steps inside the tower are in poor condition. The tower is isolated from the dam and is accessed by placing a

board from the dam to the tower. The Assistant Town Engineer indicated concern that during a high flow situation, the tower would become submerged and operation of the valves would be very difficult. The top of the intake tower is at the elevation of the top of the dam.

d. Reservoir Area:

The reservoir is formed by flooding a portion of the Hawley Brook Valley. The reservoir is bordered by a gentle forested slope to the west, a flat forested area to the northeast and a flat grassed area (picnic area) to the southeast. No unusual geologic features were noted that could be expected to adversely affect the dam or appurtenant structures.

e. Downstream Channel:

The pond of the Unionville Reservoir (Countryside Park) Lower Dam is located immediately downstream (Photo C-4).

Below the lower dam the natural channel extends approximately 3200 feet to the Farmington River.

3.2 Evaluation:

Based on the visual inspection, the Unionville Reservoir Upper Dam appears to be in fair condition overall, and there were no major areas of distress noted. Specific areas of concern that were noted are:

a. The presence of possible seepage at the downstream toe of the western embankment.

b. The brush and tree growth, and erosion/low areas on the embankments.

c. The deteriorated condition of the cover and the manhole steps in the intake tower.

d. The difficulty in access to the tower and operation of the outlet works during a high water situation.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures:

a. General: The Unionville Reservoir Upper Dam is presently used for periodic filling of the lower pond (which is used for swimming) via the 16 inch blowoff.

b. Description of Any Warning System in Effect: No formal emergency or contingency plan is in effect to reduce or minimize downstream damage in emergency situations.

4.2 Maintenance Procedures:

a. General: There is no regular maintenance schedule for this dam. The dam is periodically visually inspected. No records are kept of these inspections.

b. Operating Facilities: No regular maintenance of the outlet works was reported. All valves are tested twice a year.

4.3 Evaluation:

To insure the safety of the residents downstream, a regular inspection and maintenance program and a formal downstream warning plan should be developed and implemented.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General:

The Unionville Reservior Upper Dam creates an impoundment with a total storage capacity of 16 ac.-ft. at elevation 395.0, the spillway crest elevation. Each foot of depth in the reservoir above the spillway crest can accommodate approximately 1.5 ac.-ft. The spillway is a 27 foot long by 4 foot wide broad crested uncontrolled weir. Stream and basin slopes are steep, 3 percent and 15 percent, respectively.

5.2 Design Data:

a. No specific design data is available for this watershed or the structures of the Unionville Reservoir Upper Dam. In lieu of existing design information, USGS topographic maps (scale 1"=2000') were utilized to develop hydrologic parameters such as drainage area, basin length, time of concentration, and other runoff characteristics. Elevation-storage relations for the reservoir were approximated. Reservoir surface area and surcharge storage were computed using the USGS maps. Some of the pertinent hydraulic design data was obtained and/or confirmed by actual field measurements at the time of the visual inspection.

b. Outflow values (routing procedures) and dam overtopping analyses were computed in accordance with the guidelines developed by the Corps of Engineers. Judgment was used in calculating final values outlined in this report, which are quite approximate and should not be considered a substitute for actual detailed analysis.

5.3 Experience Data:

Historical data for recorded discharges is not available for this dam.

5.4 Test Flood Analysis:

Recommended guidelines for the Safety Inspection of Dams by the Corps of Engineers were used for the selection of the "Test Flood". This dam is classified as a HIGH hazard and SMALL size structure. Guidelines indicate that a range of 1/2 times the Probable Maximum Flood (PMF) to the PMF be used as the "Test Flood" for these classifications. A test flood of 1/2 PMF was chosen due to the small size of the dam and the hazard potential which is on the low side of the high hazard classification. The watershed has a total area of 0.9 square miles. Snyder's lag was calculated to be 2.14 hours and a Snyder peaking coefficient of 0.625 was used. The 200 square mile - 24 hour Probable Maximum Precipitation (PMP) is 21.5 inches. The flood hydrograph package, HEC-1 computer program developed by the Corps of Engineers was utilized to develop the inflow hydrograph, route the flood through the reservoir, and for the dam overtopping analysis. A test flood inflow equal to 1/2 PMF was calculated to be 1020 cfs (1130 CSM).

This test flood analysis assumes that the outlet works are closed, and that the reservoir is full at the beginning of inflow. The effect of the spillway bridge was not considered in this analysis.

The spillway capacity is hydraulically inadequate to pass the test flood (1/2 PMF) and overtopping of the dam will occur. The maximum outflow capacity of the spillway without overtopping the dam is 100 cfs. This corresponds to approximately 10 percent of the test flood outflow and a storage of above the spillway level of 2 ac.-ft. The maximum outflow discharge value for the test flood is 1020 cfs corresponding to a depth of flow over the top of the dam of 0.9 feet and a storage above the spillway level of 4 ac.-ft. A spillway rating curve, an outlet rating curve, and a reservoir stage-capacity curve, are included in Appendix D of this report.

At the spillway elevation of 395.0, the capacity of the 16 inch outlet structure is 30 cfs. It will require approximately 2/3 hour to lower the water level the first foot assuming a water surface area of 1.5 acres, normal inflow conditions, and use of the outlet works to regulate the water level for expected inflows.

5.5 Dam Failure Analysis:

This dam is classified as a HIGH hazard structure. Failure discharge can cause damage due to high velocities, impact from debris, and flooding to two homes, and a building along the downstream channel and two roads.

The calculated dam failure discharge is 9000 cfs due to an assumed breach width of 46 feet and pre-failure a pool level equal to the top of the dam. At this level the pre-failure flow in the downstream channel will be equal to the full spillway's capacity of 100 cfs corresponding to a depth of flow of less than 1 foot.

Failure will overtop the lower dam by approximately 7 feet. The depth of inundation at the two homes and building would be 0 feet before and 2 to 3 feet after dam failure.

Failure discharge will affect downstream areas for a distance of 3600 feet. At this distance, the water surface level will be approximately 1 foot above normal observations as it enters the Farmington River. Beyond 3600 feet, the effects of the failure discharge will be reduced as it enters the Farmington River. Water surface elevations due to the failure of the dam are listed on Page D-14. Probable consequences including the prime impact areas are listed on Page D-21 .

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observation:

The visual inspection revealed no signs of major physical distress in the structure. However, possible seepage was noted at the downstream toe of the western embankment.

6.2 Design and Construction Data:

There is insufficient design and construction data to permit a formal evaluation of stability.

6.3 Post-Construction Changes:

The foot bridge was built across the spillway in 1968.

6.4 Seismic Stability:

The dam is in Seismic Zone 1 and hence does not require evaluation for seismic stability according to the Corps of Engineers Recommended Guildlines.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment:

a. Condition:

Based on the visual inspection, past performance and hydraulic/hydrologic evaluation, the Unionville Reservoir Upper Dam and appurtenances are judged to be generally in FAIR condition. Items of concern that should be addressed as a result of this inspection are listed in Section 7.2 and 7.3.

b. Adequacy of Information:

The lack of engineering data did not allow for a definitive review. Therefore, the adequacy of the dam is based on visual inspection, past performance history, and engineering judgment.

c. Urgency:

The recommendations and remedial measures described below should be implemented by the owner within one year after receipt of this Phase I Inspection Report.

7.2 Recommendations:

It is recommended that the owner engage a qualified registered engineer to carry out the following actions and that his recommendations be implemented.

a. A detailed hydrologic/hydraulic investigation to determine the need for and means of increasing the discharge capacity of the project.

b. An investigation to determine the means of providing access to the intake tower during high flow periods.

c. Investigate and monitor the seepage at the downstream toe of the west embankment. A collection system with a measuring device should be designed.

d. The cover of and the manhole steps in the intake tower be repaired or replaced.

e. The leaking 6 inch valve be repaired or replaced.

f. The removal of the trees and their respective root systems on the embankments of the dam and backfilling with suitable compacted material.

g. Means of limiting access to the slopes of the dam be investigated and implemented.

7.3 Remedial Measures:

a. Operational and Maintenance Procedures:

1. The brush on the embankments should be removed. The brush should also be removed for at least 15 feet beyond the downstream toe of the western embankment to allow for access and inspection.

2. The erosion areas (foot paths, low area and top of dam) should be filled and revegetated.

3. The spalled concrete on the spillway should be repaired.

4. Develop a surveillance and downstream warning plan, including round-the-clock monitoring during heavy precipitation.

5. Institute a program of annual periodic technical inspection.

7.4 Alternatives:

There are no practical alternatives to the above stated recommendations.

APPENDIX A

INSPECTION CHECK LIST

INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Unionville Reservoir
Upper Dam

DATE November 12, 1980

TIME 1:00 - 4:00 P.M.

WEATHER Partly Cloudy

W.S. ELEV. _____ U.S. _____ DN.S.

PARTY:

1. R. Johnston, JPPA
2. J. Hewes, JPPA
3. J. Walsh, Baystate Environmental Consultants, Inc.
4. _____
5. _____
6. K. Wassall, E. Pease
7. Town of Avon
8. _____
9. _____
10. _____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Hydraulics	R. Johnston	
2.	Structural	J. Hewes	
3.	Geotechnical	J. Walsh	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

INSPECTION CHECK LIST

PROJECT Unionville Reservoir Upper Dam — DATE November 12, 1980

PROJECT FEATURE _____ — NAME _____

DISCIPLINE _____ — NAME _____

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation 396.3	Good - Grassed
Current Pool Elevation 395.0	Spillway Crest
Maximum Impoundment to Date	Top of Dam
Surface Cracks	None Observed
Pavement Condition	N/A
Movement or Settlement of Crest	Erosion of up to 1 ft. on each side of suspected core wall
Lateral Movement	None Observed
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Good - Minor Erosion
Indications of Movement of Structural Items on Slopes	N/A
Trespassing on Slopes	Yes - Permitted
Vegetation on Slopes	Yes - Brush and trees
Sloughing or Erosion of Slopes or Abutments	Erosion on west downstream face. Foot paths on east face
Rock Slope Protection - Riprap Failures	N/A
Unusual Movement or Cracking at or near Toes	None Observed
Unusual Embankment or Downstream Seepage	Seepage at erosion area on west downstream face.
Piping or Boils	None Observed
Foundation Drainage Features	None Observed
Toe Drains	None Observed
Instrumentation System	None Observed

INSPECTION CHECK LIST

PROJECT Unionville Reservoir Upper Dam — DATE November 12, 1980

PROJECT FEATURE _____ — NAME _____

DISCIPLINE _____ — NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	
General Condition	Good
Condition of Joints	Good
Spalling	Minor
Visible Reinforcing	None Observed
Rusting or Staining of Concrete	Minor on Interior
Any Seepage or Efflorescence	Minor through walls
Joint Alignment	Good
Unusual Seepage or Leaks in Gate Chamber	Minor through walls and through 6 inch pipe valve.
Cracks	None Observed
Rusting or Corrosion of Steel	All pipes, valves and manhole steps
b. Mechanical and Electrical	
Air Vents	None Observed
Float Wells	None Observed
Crane Hoist	None Observed
Elevator	None Observed
Hydraulic System	None Observed
Service Gates	Various - see plan
Emergency Gates	Various - see plan
Lightning Protection System	None Observed
Emergency Power System	None Observed
Wiring and Lighting System in Gate Chamber	None Observed

INSPECTION CHECK LIST

PROJECT Unionville Reservoir Upper Dam DATE November 12, 1980

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	Spillway Bridge
a. Super Structure	
Bearings	Good
Anchor Bolts	N/A
Bridge Seat	Good
Longitudinal Members	Good
Under Side of Deck	Good
Secondary Bracing	Good
Deck	Good
Drainage System	N/A
Railings	Good
Expansion Joints	None Observed
Paint	Stained - Needs new coat
b. Abutment	
General Condition of Concrete	Good
Alignment of Abutment	Good
Approach to Bridge	Good - Timber ramps
Condition of Seat & Backwall	Good

INSPECTION CHECK LIST

PROJECT Unionville Reservoir Upper Dam

DATE November 12, 1980

PROJECT FEATURE

NAME

DISCIPLINE

NAME

AREA EVALUATED	CONDITION
OUTLET WORKS	16 Inch Blowoff
a. Approach Channel	Entire pond bed, underwater
b. Intake Structure	Free access in pond and tee in intake tower. Various auxilliary inlets into intake tower - see plan.
c. Transition and Conduit	Gate valves, operated from intake tower, controls discharge into pipe. Pipe extends through dam to free outlet.
d. Outlet Structure and Outlet Channel	Free outlet on downstream face of spillway section. Half of pipe diameter is broken and missing. Outlet channel is reservoir of lower dam.

INSPECTION CHECK LIST

PROJECT Unionville Reservoir Upper Dam DATE November 12, 1980

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	Pond Bed - Underwater
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	
General Condition of Concrete	Good
Rust or Staining	None Observed
Spalling	Yes on downstream face
Any Visible Reinforcing	None Observed
Any Seepage or Efflorescence	Spillway flowing
Drain Holes	None Observed
c. Discharge Channel	Lower Dam Reservoir
General Condition	Minor spalling on wingwalls.
Loose Rock Overhanging Channel	None Observed
Trees Overhanging Channel	Few on pond shore.
Floor of Channel	Underwater
Other Obstructions	Lower Dam

APPENDIX B

ENGINEERING DATA

CONTENTS

APPENDIX B-1

DESIGN, CONSTRUCTION AND MAINTENANCE RECORDS

Location	Items
Mr. Victor J. Galgowski Dam Safety Engineer Water Resources Unit Department of Environmental Protection State of Connecticut State Office Building Hartford, Connecticut 06115	* 1. State Inspection Reports

* Indicates material contained in this Phase I Inspection Report.

APPENDIX B-2

COPIES OF PAST INSPECTION REPORTS

BUCK & BUCK

ENGINEERS

98 WADSWORTH STREET, HARTFORD, CONNECTICUT 06106

JAMES A. THOMPSON
ROBINSON W. BUCK
LAWRENCE P. BUCK

HENRY WOLCOTT BUCK
1921-1965
ROBINSON B. BUCK
1926-1959

COMM. 5713-164

March 26, 1980

Mr. Victor Galgowski
Superintendent of Dams
Department of Environmental Protection
State Office Building, Capitol Avenue
Hartford, Connecticut, 06115

Reference: Countryside Park Dams
Avon, Connecticut

Dear Vic:

I inspected the two dams in Countryside Park, Avon, owned by the Town of Avon, this morning and herewith submit my report.

Unconcrete Rip

UPPER DAM: The dam appears to be in sound condition. There is a slight amount of seepage in a depression at the base of the westerly embankment, however, this seepage is long standing and not serious. The downstream face of the embankment is overgrown with brush and briars and must be cleared. We also noted an area of spalling concrete at the easterly downstream face of the spillway. The spalled area should be cleaned of loose concrete and restored to its original outline to prevent further and more serious damage to the structure.

LOWER DAM: At the time of my inspection, the lower pond had been drained permitting an inspection of the entire upstream face of the dam and the entire outlet gate structure. The upstream face of the dam is in good condition, however, the gate structure is literally falling apart. The upper five feet of the masonry portion of this structure has been practically destroyed by frost and ice action and is no longer a safe structure. The gate structure should be repaired before water is allowed to be impounded.

The top and downstream face of the dam embankment are covered with brush and large trees, all of which must be removed. We also found a very wet, soft area at the westerly base of the downstream slope. The embankment is very steep and it appears that there may have been erosion or some form of soil movement in the vicinity of the wet area. I suspect that if the pond were full of water, we would have seen a substantial seepage flow in the wet area. I recommend that when the downstream embankment is cleared, the wet area of the base be filled with a free draining gravel, after removal of surface organics. The finished grade of the filled area should not exceed 2:1.

I recommend that the owners of the dam be ordered to complete the repairs to the dam and gate structure before being allowed to refill the pond. Repairs to the gate structure and the dam should be done at the direction of a professional Engineer.

Sincerely yours,

BUCK & BUCK

James A. Thompson

JAT/sm

No. _____

Inventoried By _____

Date _____

WATER RESOURCES UNIT
SUPERVISION OF DAMS
INVENTORY DATA

Lat: 41° 47' 10"
Long: 72° 54' 35"

Name of Dam or Pond Unionville Reservoir (Upper)

Code No. _____

Nearest Street Location Huckleberry Hill Road

Town Avon

U.S.G.S. Quad. Collinsville

Name of Stream Hawley Brook

Owner Town of Avon

Address _____

Pond Used For Public Supply Drainage Area .7 sq. mi.

Dimensions of Pond: Width _____ Length _____ Area 2.5 ac.

Total Length of Dam 250' Length of Spillway 20'

Location of Spillway Center of Dam

Height of Pond Above Stream Bed 32'

Height of Embankment Above Spillway 2'

Type of Spillway Construction Concrete

Type of Dike Construction Earth and stone

Downstream Conditions Road ¼ mile, homes 500'

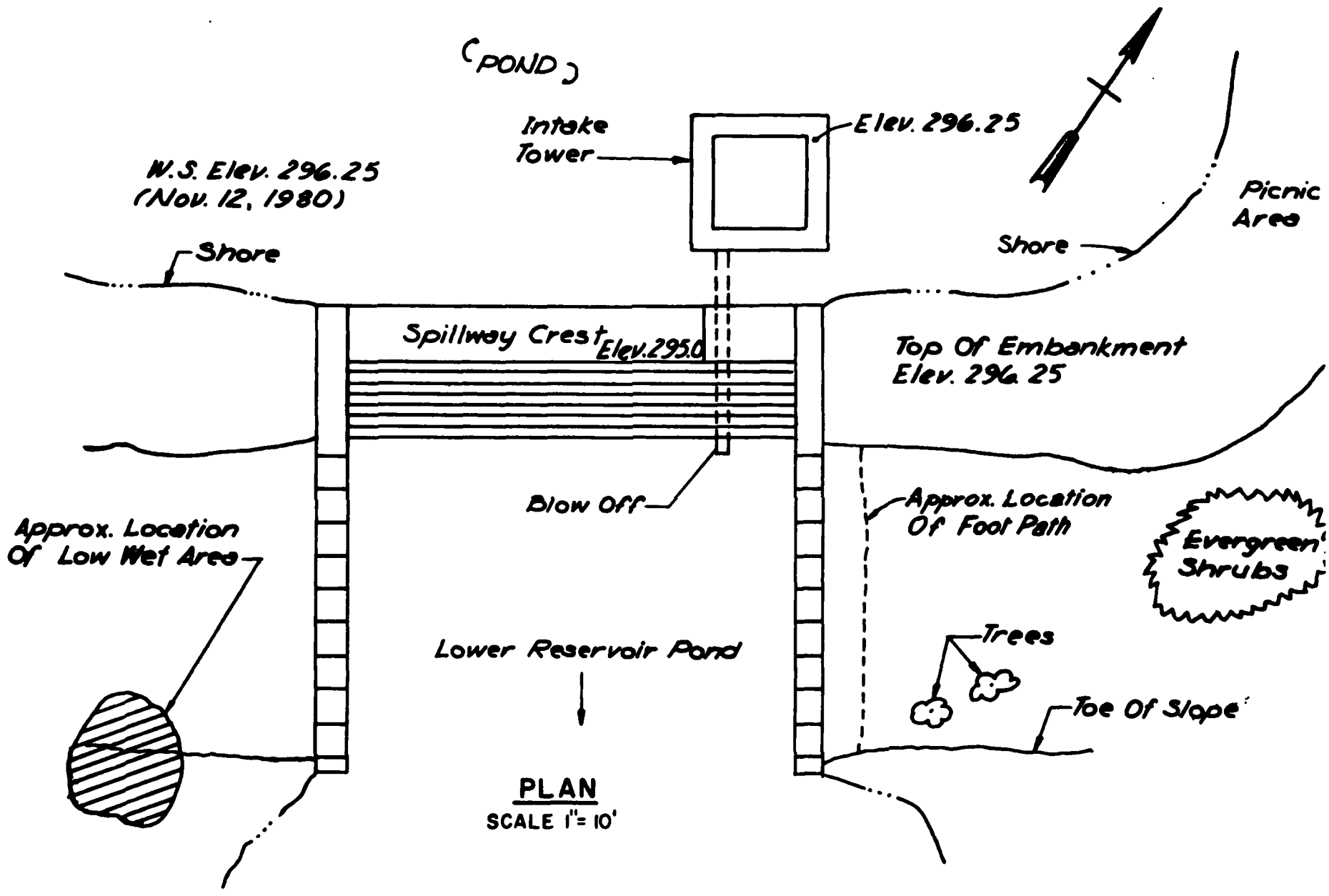
Summary of File Data _____

Remarks _____

Would Failure Cause Damage? YES Class B

APPENDIX B-3

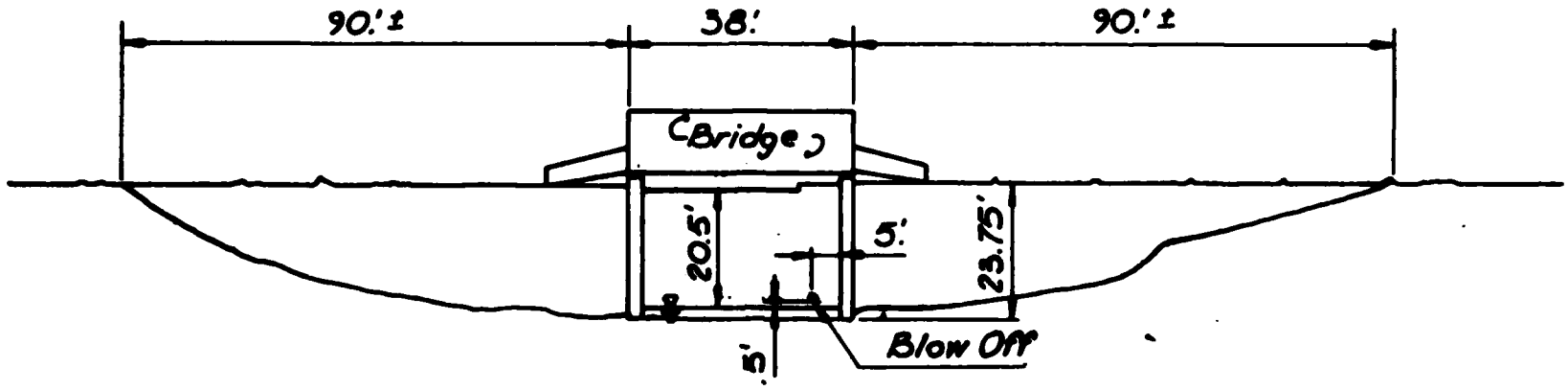
RECORD DRAWINGS AND SKETCHES



UNIONVILLE RESERVOIR UPPER DAM

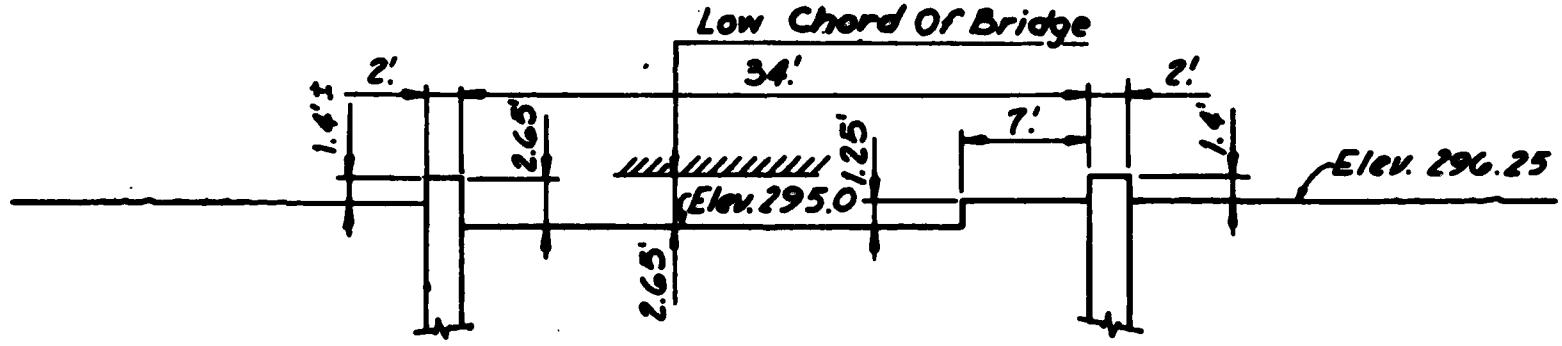
JAMES P. PURCELL ASSOCIATES, INC.

ENGINEERS • ARCHITECTS • PLANNERS



ELEVATION OF DAM LOOKING UPSTREAM

SCALE 1"= 30'



ELEVATION OF SPILLWAY LOOKING UPSTREAM

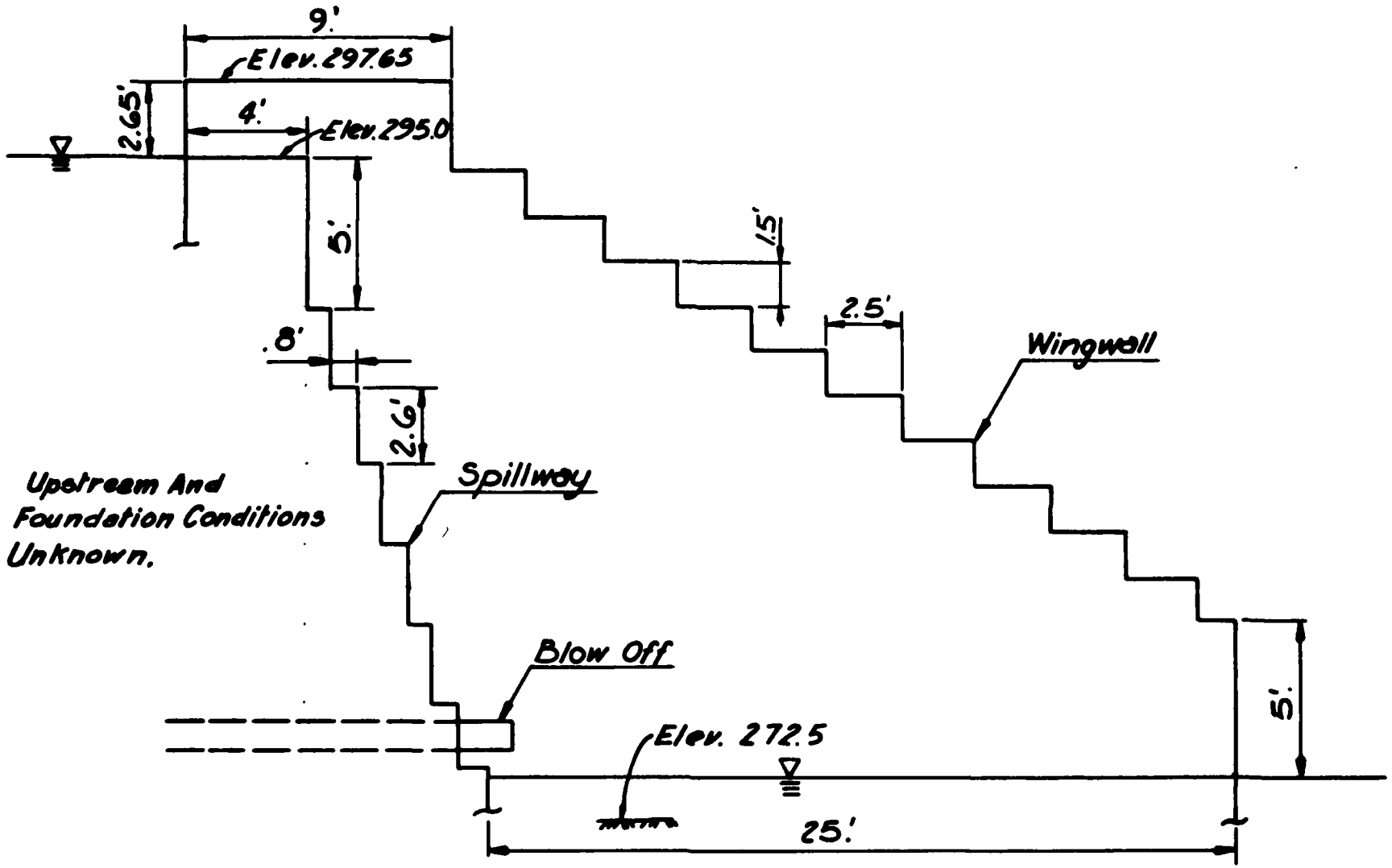
SCALE 1"= 10'

B-8

UNIONVILLE RESERVOIR UPPER DAM

JAMES P. PURCELL ASSOCIATES, INC.

ENGINEERS • ARCHITECTS • PLANNERS



6-8

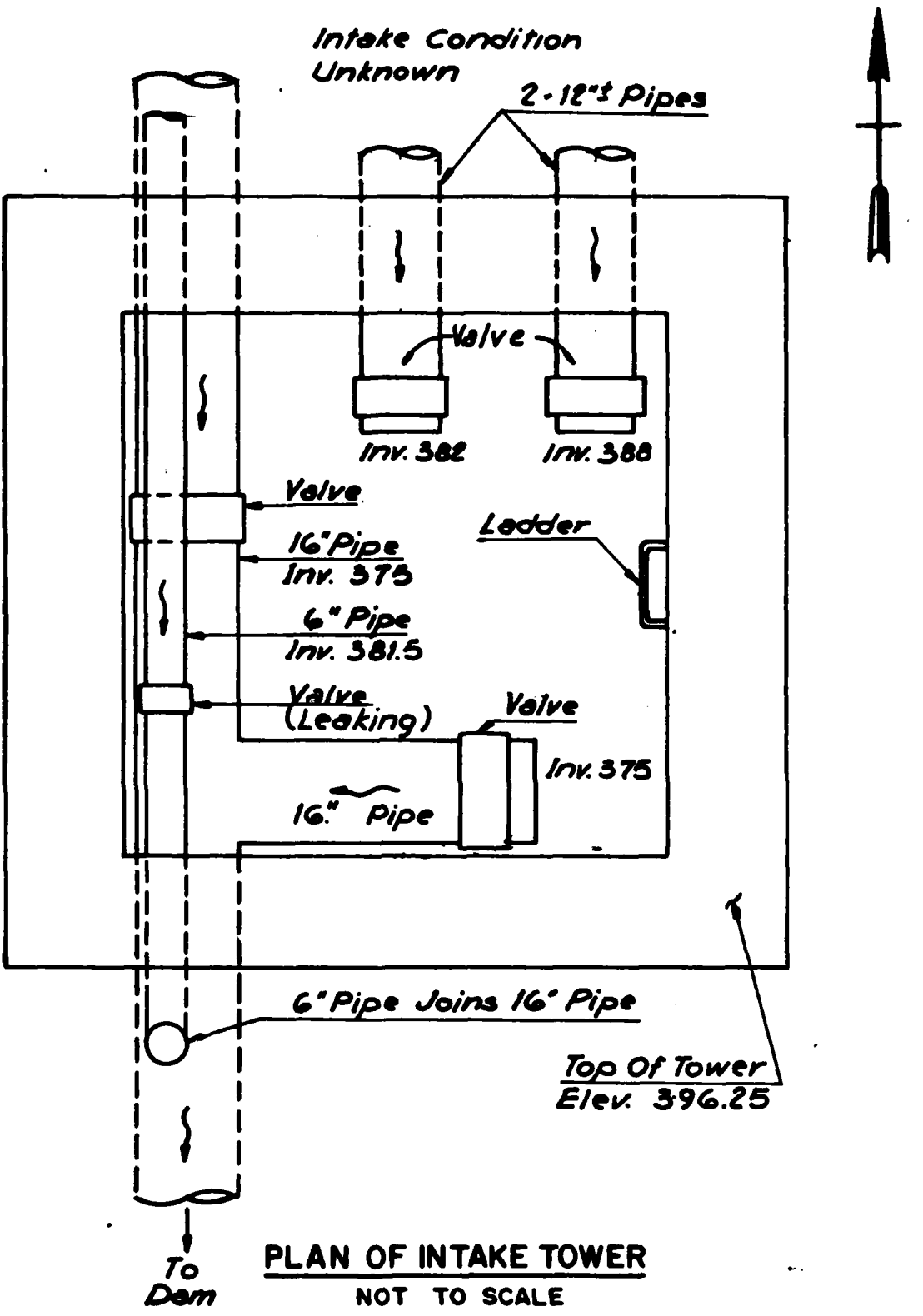
CROSS SECTION THROUGH DAM

SCALE 1" = 5'

UNIONVILLE RESERVOIR UPPER DAM

JAMES P. PURCELL ASSOCIATES, INC.

ENGINEERS • ARCHITECTS • PLANNERS



PLAN OF INTAKE TOWER

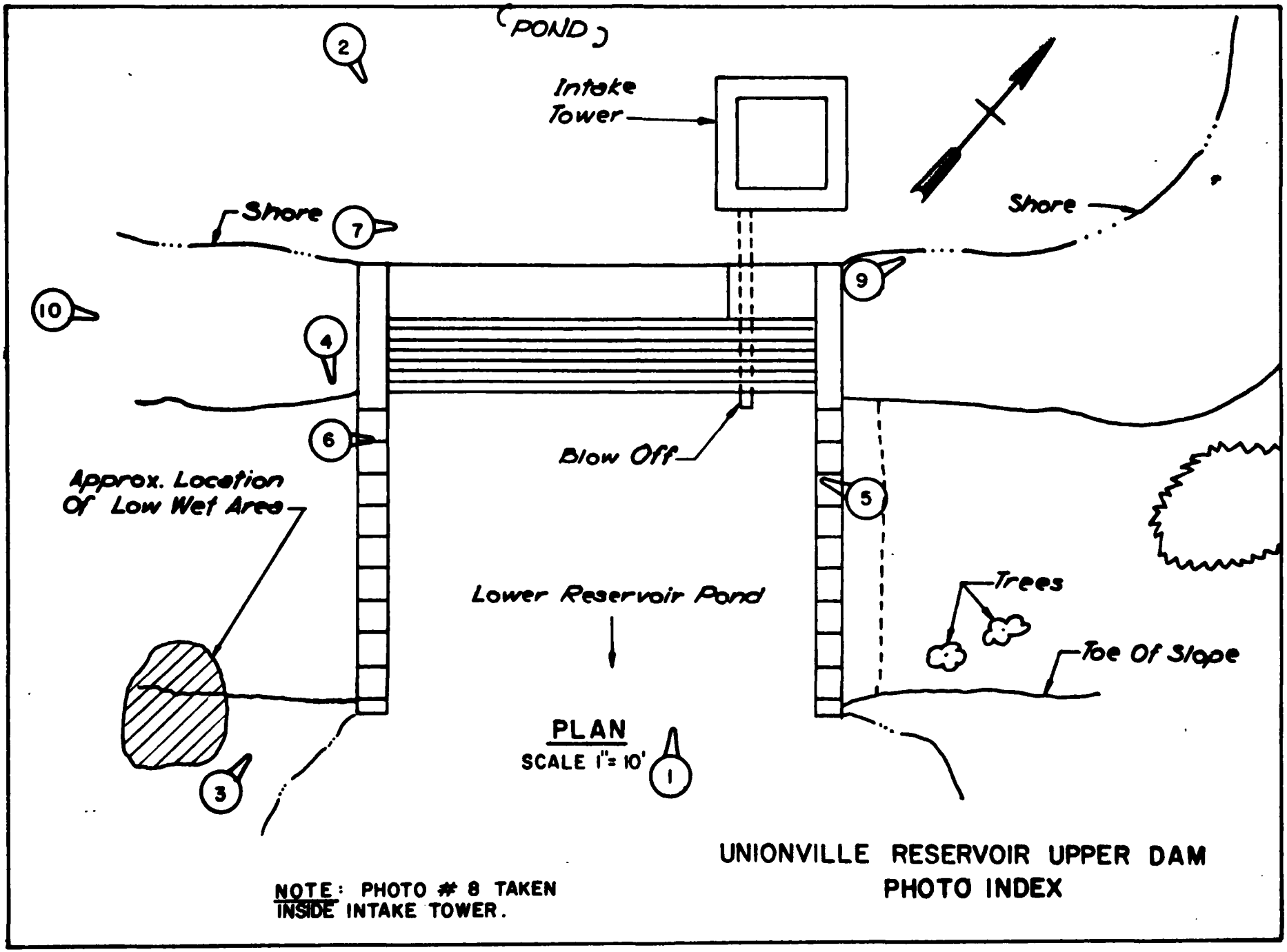
NOT TO SCALE

UNIONVILLE RESERVOIR UPPER DAM

JAMES P. PURCELL ASSOCIATES, INC.
ENGINEERS • ARCHITECTS • PLANNERS

APPENDIX C

PHOTOGRAPHS

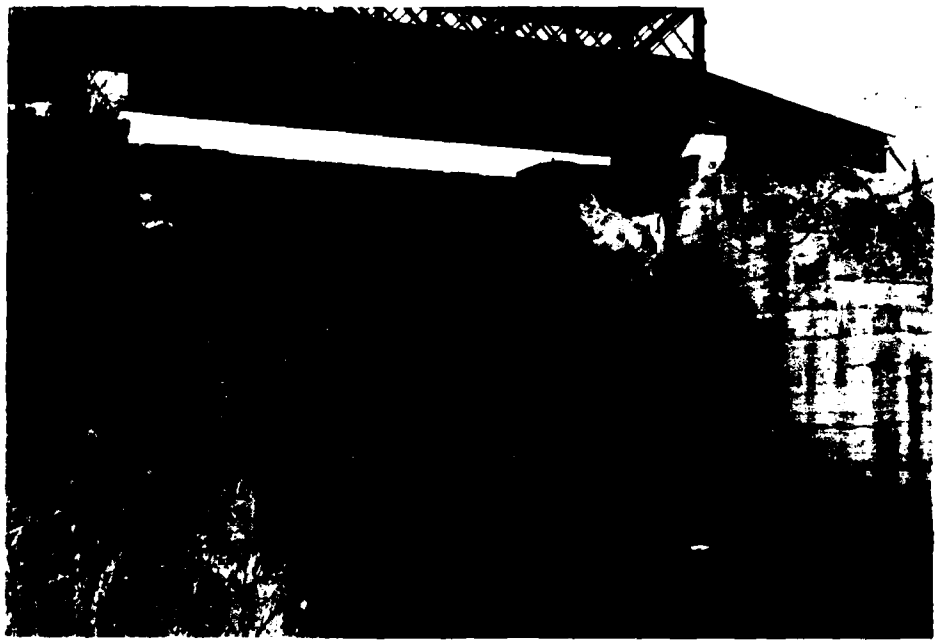


UNIONVILLE RESERVOIR UPPER DAM
PHOTO INDEX

NOTE: PHOTO # 8 TAKEN INSIDE INTAKE TOWER.

C-1 DAM AND SPILLWAY - LOOKING NORTH

C-2 SPILLWAY AND BRIDGE - LOOKING SOUTH



C-3 DOWNSTREAM FACE OF SPILLWAY SHOWING BLOWOFF AND SPALLED AREA.

C-4 LOWER POND AND DAM - LOOKING FROM TOP OF DAM

C-5 WEST END OF SPILLWAY

C-6 DOWNSTREAM FACE OF EAST SIDE OF DAM SHOWING TREES AND SHRUBS

C-7 INTAKE TOWER - LOOKING FROM WEST TOP OF DAM

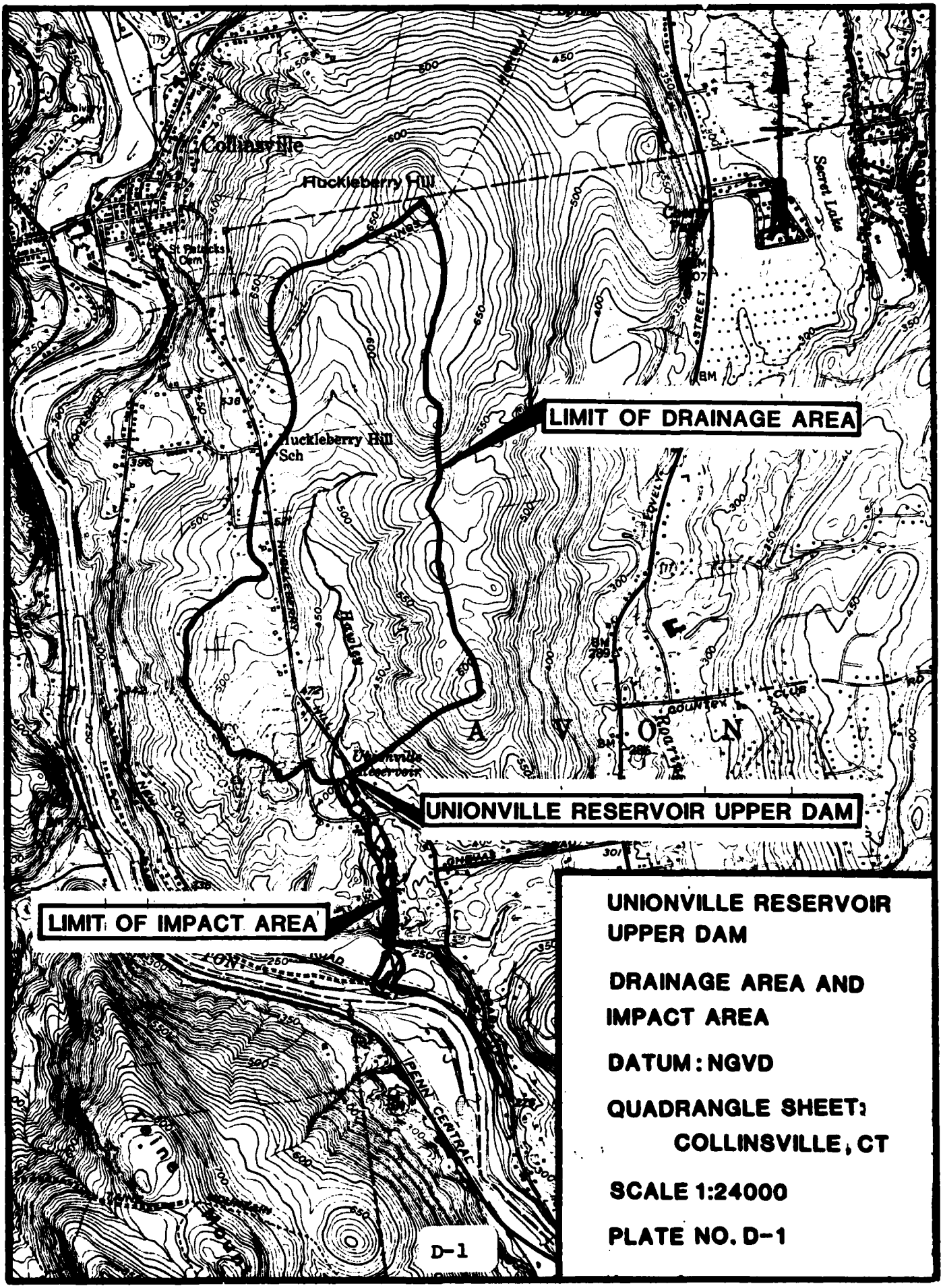
C-8 INTERIOR OF INLET TOWER - TOP OF PHOTO IS NORTH

C-9 EAST TOP OF DAM LOOKING EAST - SHOWING EROSION OF TOP OF DAM ALONG SUSPECTED CORE WALL.

C-10 WEST TOP OF DAM - LOOKING EAST

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



UNIONVILLE RESERVOIR UPPER DAM

DRAINAGE AREA AND IMPACT AREA

DATUM: NGVD

QUADRANGLE SHEET: COLLINSVILLE, CT

SCALE 1:24000

PLATE NO. D-1

HYDROLOGIC AND HYDRAULIC ANALYSIS
SUMMARY SHEET

Dam UNIONVILLE RESERVOIR UPPER DAM

Test Flood 1/2 PMF

INFLOW HYDROGRAPH DEVELOPMENT

Drainage Area 0.9 sq. mi.

Probable Maximum Precipation
24 hour - 200 square mile PMP 21.5 inches

Initial Rainfall Loss 0 Inch
Uniform Rainfall Loss .1 Inch

Snyder's Lag 2.14 hours
Snyder's Peaking Coefficient .625

Test Flood Inflow 1020 CFS

PMF Inflow 2040 CFS

RESERVOIR ROUTING AND DAM OVERTOPPING

Test Flood Outflow 1020 CFS

Spillway Capacity at Top of Dam 100 CFS
10 % of Test Flood

Flow Over Spillway at Test Flood 225 CFS

Spillway Crest Elevation	395.00	Feet
Top of Dam Elevation	396.25	Feet
Test Flood Elevation	397.15	Feet

```
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
 LAST MODIFICATION  26 FEB 79
     A1      DAM SAFETY ANALYSIS - JOB 80-100/03   ERJ
     A2      UNIONVILLE RESERVOIR   UPPER DAM   - AVON, CT                    FINAL
     A3      12-08-80
     B     75          1       0       0       0       0       0       2       0       0
     B1      5         2
     J       1         2       1
     J1     .5         1
     K                                                       1
     K1      COMPUTATION OF PMF - DEVELOPMENT OF INFLOW HYDROGRAPH
     M       1         1     -0.9            0.9                                     1
     P     0.    21.5    118.    124.    133.    142.
     T     0.    0.      0.      0.      0.      0.      0.      0.      0.1
     W   2.24  0.625
     X   2.0   0.09    2.0
     K       1         1                                       1
     K1      ROUTING INFLOW HYDROGRAPH THRU POND - OVERTOPPING ANALYSIS
     Y                       1       1                               -1
     Y1      1
     SA    1.5   1.9     3.0     6.0
     SE  395.  396.25  400.    410.
     SS  395.  27.     2.65    1.5
     SD396.25  2.65    1.5     350.
     K     00
```

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79

RUN DATE= 12/08/80.
TIME= 08.42.48.

DAM SAFETY ANALYSIS - JOB 80-100/03 ERJ
UNIONVILLE RESERVOIR UPPER DAM - AVON, CT
12-08-80

NQ	NHR	NMIN
75	6	0

JOB SPECIFICATION

IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
0	0	0	0	2	0	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 2 LRTIO= 1

RTIOS= .90 1.00

****

SUB-AREA RUNOFF COMPUTATION

COMPUTATION OF PMF - DEVELOPMENT OF INFLOW HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.90	0.00	.90	0.00	0.000	0	1	0

PRECIP DATA

SPRF	RMS	R6	R12	R24	R48	R72	R96
0.00	21.50	110.00	124.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	0.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 2.14 CP= .63 NTA= 0

RECESSION DATA
STRTQ= 2.00 QRCSN= .05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 2.64 AND R= 1.78 INTERVALS

UNIT HYDROGRAPH 11 END-OF-PERIOD ORDINATES, LAG= 2.15 HOURS, CP= .63 VOL= 1.00

42.	129.	158.	110.	62.	35.	20.	11.	6.	3.
2.									

1.01	5.00	5	$01	0.00	.01	2.	1.02	17.00	41	2.65	2.55	.10	1829.
1.01	6.00	6	$01	0.00	.01	1.	1.02	18.00	42	2.08	1.98	.10	2043.
1.01	7.00	7	$03	0.00	.01	1.	1.02	19.00	43	.15	.05	.10	1729.
1.01	8.00	8	$03	0.00	.03	1.	1.02	20.00	44	.15	.05	.10	1203.
1.01	9.00	9	$03	0.00	.03	1.	1.02	21.00	45	.15	.05	.10	731.
1.01	10.00	10	$03	0.00	.03	1.	1.02	22.00	46	.15	.05	.10	424.
1.01	11.00	11	$03	0.00	.03	1.	1.02	23.00	47	.15	.05	.10	252.
1.01	12.00	12	$03	0.00	.03	1.	1.03	0.00	48	.15	.05	.10	154.
1.01	13.00	13	$13	.03	.10	2.	1.03	1.00	49	0.00	0.00	0.00	96.
1.01	14.00	14	$15	.05	.10	7.	1.03	2.00	50	0.00	0.00	0.00	57.
1.01	15.00	15	$19	.09	.10	16.	1.03	3.00	51	0.00	0.00	0.00	25.
1.01	16.00	16	$49	.39	.10	40.	1.03	4.00	52	0.00	0.00	0.00	11.
1.01	17.00	17	$18	.08	.10	76.	1.03	5.00	53	0.00	0.00	0.00	4.
1.01	18.00	18	$14	.04	.10	88.	1.03	6.00	54	0.00	0.00	0.00	2.
1.01	19.00	19	$01	0.00	.01	69.	1.03	7.00	55	0.00	0.00	0.00	1.
1.01	20.00	20	$01	0.00	.01	44.	1.03	8.00	56	0.00	0.00	0.00	1.
1.01	21.00	21	$01	0.00	.01	26.	1.03	9.00	57	0.00	0.00	0.00	0.
1.01	22.00	22	$01	0.00	.01	15.	1.03	10.00	58	0.00	0.00	0.00	0.
1.01	23.00	23	$01	0.00	.01	8.	1.03	11.00	59	0.00	0.00	0.00	0.
1.02	0.00	24	$01	0.00	.01	5.	1.03	12.00	60	0.00	0.00	0.00	0.
1.02	1.00	25	$10	.00	.10	3.	1.03	13.00	61	0.00	0.00	0.00	0.
1.02	2.00	26	$10	.00	.10	2.	1.03	14.00	62	0.00	0.00	0.00	0.
1.02	3.00	27	$10	.00	.10	2.	1.03	15.00	63	0.00	0.00	0.00	0.
1.02	4.00	28	$10	.00	.10	2.	1.03	16.00	64	0.00	0.00	0.00	0.
1.02	5.00	29	$10	.00	.10	2.	1.03	17.00	65	0.00	0.00	0.00	0.
1.02	6.00	30	$10	.00	.10	2.	1.03	18.00	66	0.00	0.00	0.00	0.
1.02	7.00	31	$40	.30	.10	15.	1.03	19.00	67	0.00	0.00	0.00	0.
1.02	8.00	32	$40	.30	.10	53.	1.03	20.00	68	0.00	0.00	0.00	0.
1.02	9.00	33	$40	.30	.10	100.	1.03	21.00	69	0.00	0.00	0.00	0.
1.02	10.00	34	$40	.30	.10	133.	1.03	22.00	70	0.00	0.00	0.00	0.
1.02	11.00	35	$40	.30	.10	151.	1.03	23.00	71	0.00	0.00	0.00	0.
1.02	12.00	36	$40	.30	.10	162.	1.04	0.00	72	0.00	0.00	0.00	0.
1.02	13.00	37	1$89	1.79	.10	230.	1.04	1.00	73	0.00	0.00	0.00	0.
							1.04	2.00	74	0.00	0.00	0.00	0.
							1.04	3.00	75	0.00	0.00	0.00	0.
									SUM	24.42	21.16	3.27	12258.
										(620.)	(537.)	(83.)	(347.11)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2043.	1463.	493.	170.	12255.
CMS	58.	41.	14.	5.	347.
INCHES		15.12	20.38	21.11	21.11
MM		384.02	517.58	536.23	536.23
AC-FT		725.	978.	1013.	1013.
THOUS CU M		895.	1206.	1249.	1249.

UNITED COMPUTING SYSTEMS, INC.

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

	0.	400.	800.	1200.	1600.	2000.	2400.
	0.	0.	0.	0.	0.	0.	0.

	0.	0.	0.	0.	8.	6.	4.	2.	0.
									PRECIP(L) AND EXCESS(X)
1.00	11								L
2.00	21								L
3.00	31								L
4.00	41								L
5.00	51								L
6.00	61								L
7.00	71								L
8.00	81								L
9.00	91								L
10.00	101								L
11.00	111								L
12.00	121								L
13.00	131								LX
14.00	141								LX
15.00	151								LX
16.00	16.I								LXX
17.00	17. I								LX
18.00	18. I								LX
19.00	19. I								L
20.00	20.I								L
21.00	21.I								L
22.00	221								L
23.00	231								L
0.00	241								L
1.00	251								LX
2.00	261								LX
3.00	271								LX
4.00	281								LX
5.00	291								LX
6.00	301								LX
7.00	311								LXX
8.00	32.I								LXX
9.00	33. I								LXX
10.00	34. I								LXX
11.00	35. I								LXX
12.00	36. I								LXX
13.00	37. I								LXXXXXXXXX
14.00	38. I								LXXXXXXXXXX
15.00	39.	I.							LXXXXXXXXXXXXX
16.00	40.	I							LXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
17.00	41.		I						LXXXXXXXXXXXXX
18.00	42.			I					LXXXXXXXXXX
19.00	43.		I						LX
20.00	44.	I							LX
21.00	45.	I							LX
22.00	46.	I							LX
23.00	47. I								LX
0.00	48. I								LX
1.00	49. I								L
2.00	50.I								L
3.00	51.I								L
4.00	521								L
5.00	531								

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

1.	1.	1.	1.	1.	1.	1.	0.
0.	0.	1.	3.	8.	20.	38.	44.
13.	7.	4.	2.	1.	1.	1.	1.
7.	27.	50.	66.	76.	81.	115.	221.
914.	1021.	864.	601.	365.	212.	126.	77.
13.	6.	2.	1.	1.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.			

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1021.	731.	246.	85.	6128.
CMS	29.	21.	7.	2.	174.
INCHES		7.56	10.19	10.56	10.56
MM		192.01	258.79	268.12	268.12
AC4FT		363.	489.	506.	506.
THOUS CU M		447.	603.	625.	625.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

2.	2.	2.	2.	1.	1.	1.	1.	1.	1.
1.	1.	2.	7.	16.	40.	76.	88.	69.	44.
26.	15.	8.	5.	3.	2.	2.	2.	2.	2.
15.	53.	300.	133.	151.	162.	230.	442.	752.	1233.
1829.	2043.	1729.	1203.	731.	424.	252.	154.	96.	87.
25.	11.	4.	2.	1.	1.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.					

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2043.	1463.	493.	170.	12255.
CMS	58.	41.	14.	5.	347.
INCHES		15.12	20.38	21.11	21.11
MM		384.02	517.58	536.23	536.23
AC4FT		725.	978.	1013.	1013.
THOUS CU M		895.	1206.	1249.	1249.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTING INFLOW HYDROGRAPH THRU POND - OVERTOPPING ANALYSIS

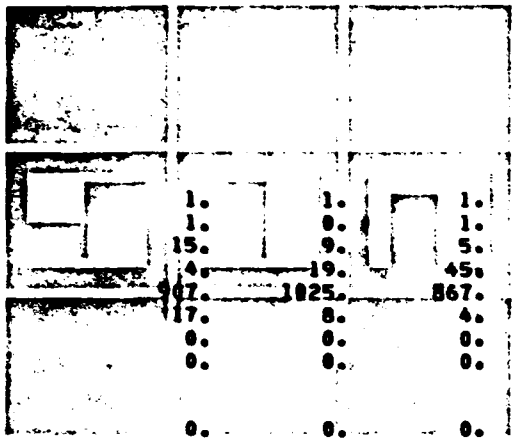
ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

SURFACE AREA= 2. 2. 3. 6.



DAM DATA

TOPEL	COOD	EXPD	DAMWID
396.3	2.7	1.5	350.

STATION 1, PLAN 1, RATIO 1

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	0.	1.	2.	6.	16.	33.	44.	38.	25.
15.	9.	5.	3.	2.	1.	1.	1.	1.	1.
4.	19.	45.	64.	74.	80.	107.	220.	369.	612.
867.	1025.	867.	609.	368.	217.	128.	85.	53.	33.
17.	8.	4.	2.	1.	1.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.					

STORAGE

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	2.	2.	2.	2.	3.	3.	3.
4.	4.	4.	3.	3.	3.	2.	2.	1.	1.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.					

STAGE

395.0	395.0	395.0	395.0	395.0	395.0	395.0	395.0	395.0	395.0
395.0	395.0	395.0	395.1	395.2	395.4	395.6	395.7	395.7	395.5
395.4	395.3	395.2	395.1	395.1	395.1	395.1	395.1	395.1	395.1
395.1	395.4	395.7	395.9	396.0	396.1	396.3	396.5	396.6	396.9
397.1	397.2	397.0	396.8	396.6	396.5	396.3	396.1	395.8	395.6
395.4	395.2	395.1	395.1	395.1	395.0	395.0	395.0	395.0	395.0
395.0	395.0	395.0	395.0	395.0	395.0	395.0	395.0	395.0	395.0
395.0	395.0	395.0	395.0	395.0					

PEAK OUTFLOW IS 1025. AT TIME 42.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1025.	731.	246.	85.	6129.
CMS	29.	21.	7.	2.	174.
INCHES		7.56	10.19	10.56	10.56
MM		192.01	258.78	268.18	268.18
AC-FT		363.	489.	507.	507.
THOUS CU M		447.	603.	625.	625.

UNITED COMPUTING SYSTEMS, INC.

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

```
          0.      200.      400.      600.      800.     1000.     1200.       0.        0.        0.        0.        0.        0.
 1.00  11
 2.00  21
 3.00  31
 4.00  41
 5.00  51
 6.00  61
 7.00  71
 8.00  81
 9.00  91
10.00 101
11.00 111
12.00 121
13.00 131
14.00 141
15.00 151
16.00 16.I
17.00 17. I
18.00 18. I
19.00 19. I
20.00 20.I
21.00 21.I
22.00 221
23.00 231
 0.00 241
 1.00 251
 2.00 261
 3.00 271
 4.00 281
 5.00 291
 6.00 301
 7.00 311
 8.00 32.I
 9.00 33. OI
10.00 34. I
11.00 35.  I
12.00 36.  I
13.00 37.  OI
14.00 38.    I
15.00 39.     OI.
16.00 40.       I
17.00 41.          OI
18.00 42.           I
19.00 43.            I
20.00 44.          I
21.00 45.       I
22.00 46.    I
23.00 47.  I
 0.00 48.  I
 1.00 49. IO
 2.00 50.IO
 3.00 51.I
 4.00 521
 5.00 531
 6.00 541
 7.00 551
```

UNITED COMPUTING SYSTEMS, INC.

STATION 1, PLAN 1, RATIO 2

END-OF-PERIOD HYDROGRAPH ORDINATES

			OUTFLOW						
1.	2.	2.	2.	2.	1.	1.	1.	1.	1.
1.	1.	1.	4.	12.	33.	68.	88.	74.	49.
30.	17.	10.	6.	4.	3.	2.	2.	2.	2.
9.	41.	91.	135.	149.	163.	224.	437.	744.	1223.
1819.	2045.	1735.	1213.	738.	430.	255.	157.	99.	66.
31.	15.	7.	3.	2.	1.	1.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.					
			STORAGE						
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	1.	2.	2.	2.	1.
1.	1.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	2.	2.	2.	2.	3.	3.	4.	4.
5.	5.	5.	4.	4.	3.	3.	2.	2.	2.
1.	1.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.					
			STAGE						
395.1	395.1	395.1	395.1	395.1	395.1	395.1	395.1	395.1	395.1
395.1	395.1	395.1	395.2	395.3	395.6	396.0	396.1	396.0	395.8
395.6	395.4	395.3	395.2	395.1	395.1	395.1	395.1	395.1	395.1
395.2	395.7	396.2	396.3	396.4	396.4	396.5	396.7	397.0	397.3
397.6	397.8	397.6	397.3	396.9	396.7	396.5	396.4	396.2	396.0
395.6	395.3	395.2	395.1	395.1	395.1	395.0	395.0	395.0	395.0
395.0	395.0	395.0	395.0	395.0	395.0	395.0	395.0	395.0	395.0
395.0	395.0	395.0	395.0	395.0					

PEAK OUTFLOW IS 2045. AT TIME 42.00 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2045.	1463.	493.	170.	12257.
CMS	58.	41.	14.	5.	347.
INCHES		15.12	20.38	21.11	21.11
MM		384.02	517.56	536.32	536.32
AC-FT		725.	978.	1013.	1013.
THOUS CU M		895.	1206.	1250.	1250.

UNITED COMPUTING SYSTEMS, INC.

STATION 1

INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)

```
          0.      400.      800.     1200.     1600.     2000.     2400.        0.        0.        0.        0.        0.        0.
 1.00  11
 2.00  21
 3.00  31
 4.00  41
 5.00  51
 6.00  61
 7.00  71
 8.00  81
 9.00  91
10.00 101
11.00 111
12.00 121
13.00 131
14.00 141
15.00 151
16.00 16.I
17.00 17. I
18.00 18. I
19.00 19. I
20.00 20.I
21.00 21.I
22.00 221
23.00 231
 0.00 241
 1.00 251
 2.00 261
 3.00 271
 4.00 281
 5.00 291
 6.00 301
 7.00 311
 8.00 32.I
 9.00 33. OI
10.00 34.  I
11.00 35.   I
12.00 36.   I
13.00 37.    I
14.00 38.     I
15.00 39.      I
16.00 40.       I
17.00 41.                 OI
18.00 42.                   I
19.00 43.                  I
20.00 44.        I
21.00 45.         I
22.00 46.      I
23.00 47.    I
 0.00 48.   I
 1.00 49.  I
 2.00 50.IO
 3.00 51.I
 4.00 521
 5.00 531
 6.00 541
 7.00 551
```

UNITED COMPUTING SYSTEMS, INC.

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .50	RATIO 2 1.00
HYDROGRAPH AT	1	.90	1	1021.	2043.
		(2.33)		(28.92)	(57.84)
ROUTED TO	1	.90	1	1025.	2045.
		(2.33)		(29.01)	(57.92)

UNITED COMPUTING SYSTEMS, INC.

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	395.00	395.00	396.25
STORAGE	0.	0.	2.
OUTFLOW	0.	0.	100.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.50	397.15	.90	4.	1025.	11.00	42.00	0.00
1.00	397.76	1.51	5.	2045.	15.00	42.00	0.00

UNIONVILLE RESERVOIR UPPER DAM

Dam Failure Analysis

1. Failure discharge with pool at top of dam (elev. 395.0) = 9000 CFS
2. Depth of water in reservoir at time of failure = 23.75 ft.
3. Maximum depth of flow downstream of dam = 7.0 ft.
4. Water surface elevation just downstream of dam at time of failure) = 374.5 (in lower pond)

The failure discharge of 9000 CFS will enter and flow downstream 3600 feet until the brook enters the Farmington River. Valley storage in this 3600 feet length of brook is significant in reducing the discharge. Also due to roughness characteristics, obstructions and frictional losses, it is very likely that the unsteady dam failure flow will dissipate its wave and kinetic energy and thus convert to steady and uniform flow obeying Manning's formulae 3600 feet downstream. The failure profile will have the following hydraulic characteristics:

DISTANCE FROM THE DAM	WATER SURFACE ELEVATION	DEPTH (ft.)	REMARKS
250	382.0	7.0	Lower pond
700	354.1	4.1	Edwards Road
1200	335.0	5.0	
1700	311.7	1.7	
2900	253.5	3.5	
3600	230.0	1±	Farmington River

NOTES:

"Rule of Thumb" Guidance for Estimating Downstream Dam Failure Analysis

DATA

Name of Dam UNIONVILLE RESERVOIR UPPER DAM

Location Town of Avon, CT

Drainage Area 0.9 sq. mi., Top of Dam 396.25

Spillway Type Broad-Overflow, Crest of Spillway 395.0

Surface Area @ Crest Elev. 1.5 Acres = 0.002 sq. mi.

Pool Bottom Near Dam = 372.50

Assumed Side Slopes of Embankments = 2:1

Depth of Pool at Dam (Yo) = 23.75 Feet

Mid-Height Elev. 384.37

Length of Dam at Crest = 220 Feet

Length of Dam at Mid-Height = 115 Feet

40% of Dam Length at Mid-Height = W_b = 46 Feet

Step 1

Storage (S) at time of failure 18 Ac-FT
(Equal to top of dam)

Step 2

Peak Failure Discharge

$$Q_{pl} = 8/27\ W_b\ \sqrt{g}\ Yo^{3/2}$$

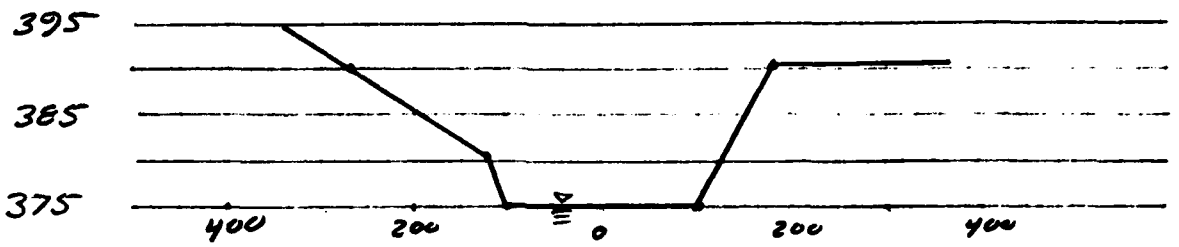
$$= (1.68)\ (W_b)\ (Y_o)^{3/2} = 9000 \text{ cfs}$$

Failure is assumed to coincide with pool elevation at top of dam

NOTES:

DAM UNIONVILLE RES. UPPER DAM

CONSIDER LOWER RESERVOIR



AVERAGE SECTION THRU LOWER RES.

LENGTH = 450 FT

UPPER RES. VOLUME = 18 AC-FT

ELEV	AREA	VOLUME
385	2875	30 AC-FT
380	1125	11.6
382	1610	16.6

USE: WIDTH = 270

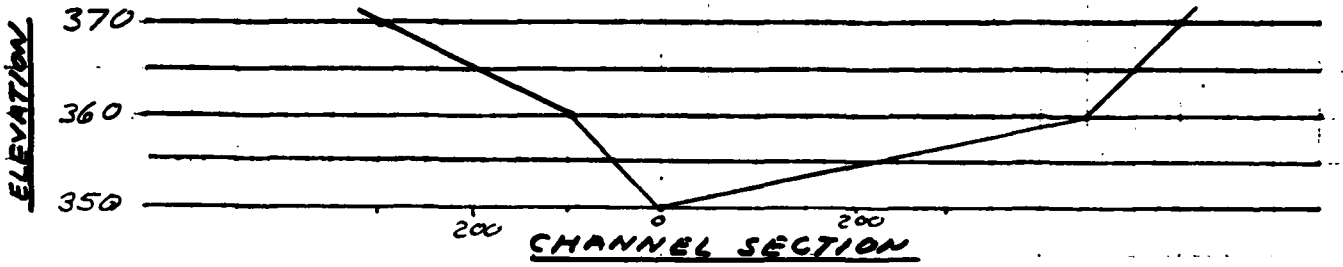
ASSUMING NO OUTFLOW FROM LOWER RES. DEPTH = 7 FT

BY EBJ DATE 11/19/18 SUBJECT DAM INSPECTION STUDY SHEET NO. 2 OF 5
CHKD. BY JR DATE 12/5/18 JOB NO. 80-100/03
DAM FAILURE ANALYSIS
PURCELL ASSOCIATES ENGINEERS • ARCHITECTS • PLANNERS

DAM UNIONVILLE RES. UPPER DAM

SECTION 700' FROM DAM (UPPER); 300' FROM LOWER DAM

USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ $n =$ .05 SLOPE (S_L) = .05 ft/ft

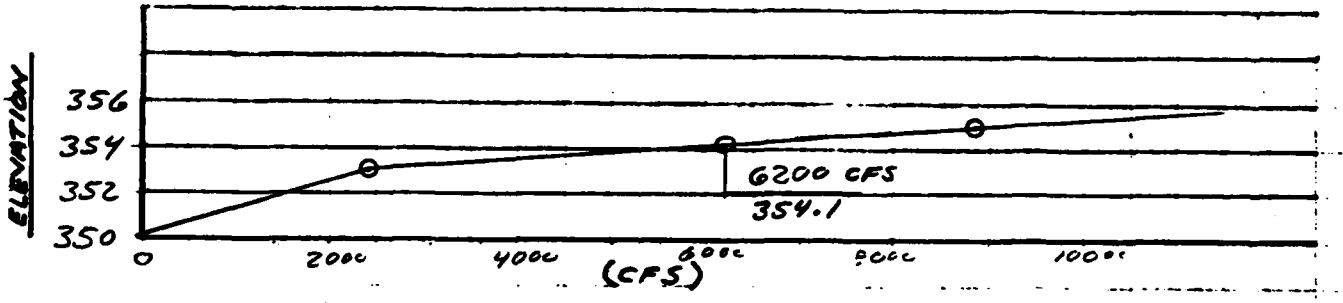


CHANNEL SECTION

FULL SPILLWAY Q_s = 100 CFS

Q_{P_1} = 9000 CFS TOTAL STORAGE (S) = 18 AC-FT

ELEV	AREA	WP	R	Q	DEPTH	
360	2750	550	5	53600	10.0	
355	700	270	2.6	8800	5.0	OK
353	270	180		2400	3.0	



$V_1 = \left(\frac{7.0 + 5.0}{2}\right)\left(\frac{270 + 270}{2}\right)\left(\frac{300}{43560}\right)\left(\frac{1}{2}\right)$ = 5.6 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_1/S)$ = 6200 CFS V_{AVG} = 5.4

$V_2 = \left(\frac{7.0 + 4.1}{2}\right)(.93)$ = 5.2 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_{AVG}/S)$ = 6300 CFS ELEV = 354.1

DEPTH = 4.1

FULL SPILLWAY @ DEPTH = 1'±

INCREASE DUE TO DAM FAILURE = 3.1'

CHKD. BY ERJ DATE 2/10/81

DAM FAILURE ANALYSIS

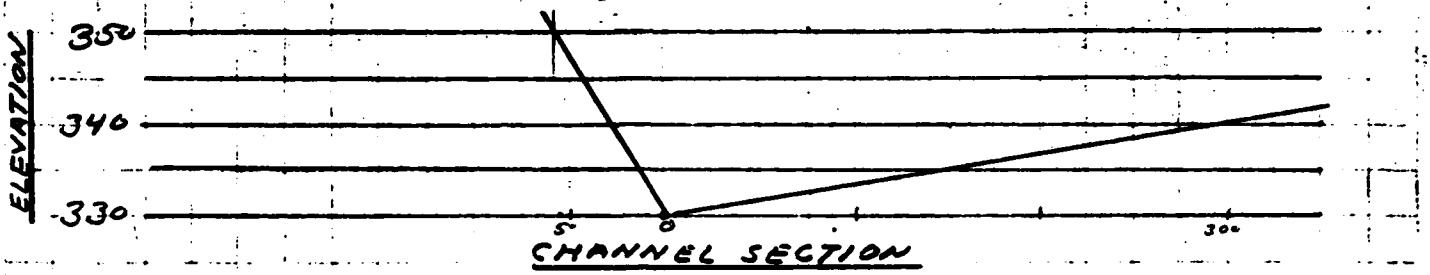
JOB NO. 80-100/03

PURCELL ASSOCIATES
ENGINEERS • ARCHITECTS • PLANNERS

DAM UNIONVILLE RESERVOIR

SECTION 1200 FEET FROM DAM

USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ $n =$ .05 SLOPE (S_L) = .045 ft/ft



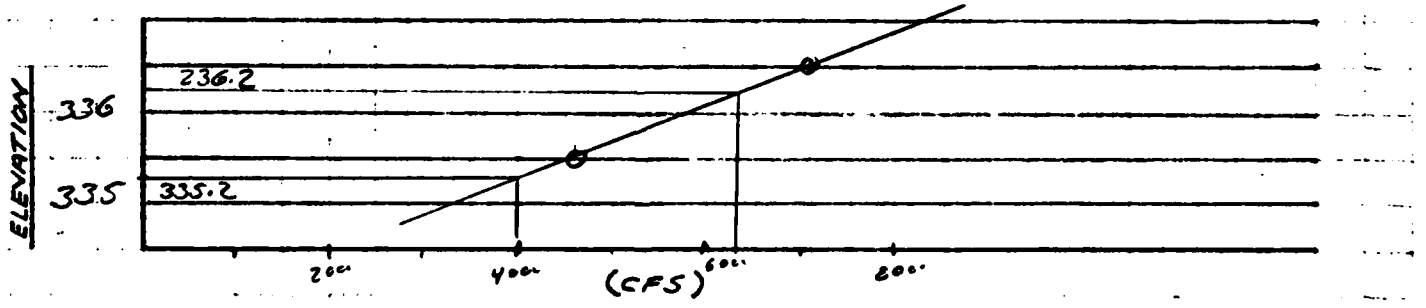
CHANNEL SECTION

Q_{P_1} = 6300 CFS

FULL SPILLWAY Q_S = 100 CFS

TOTAL STORAGE (S) = 18 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
335	400	160	2.5	4600	5
340	1600	320	5	29000	10
336	540	180	3	7100	6



$V_1 = \left(\frac{4.1 + 6.2}{2}\right)\left(\frac{270 + 180}{2}\right)\left(\frac{500}{43560}\right)\left(\frac{1}{2}\right)$ = 6.7 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_1/S)$ = 4000 CFS V_{AVG} = 5.4

$V_2 = \left(\frac{4.1 + 5.2}{2}\right)(1.3)$ = 4.0 AC-FT

$Q_{P_2} = Q_{P_1}(1 - V_{AVG}/S)$ = 4400 CFS ELEV = 335.0

DEPTH = 5.0

FULL SPILLWAY : DEPTH = 12 ft

INCREASE DUE TO DAM FAILURE = 4.0

BY RMJ DATE 11/19/86 SUBJECT DAM INSPECTION STUDY SHEET NO. 4 OF 5

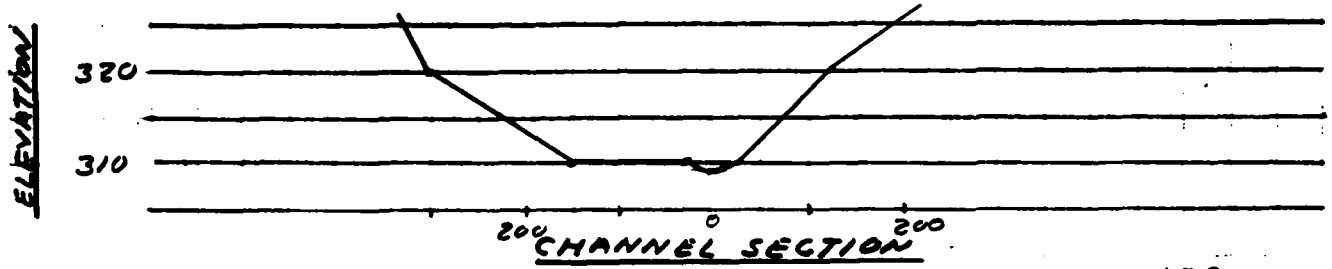
CHKD. BY JR DATE 12/5/86 DAM FAILURE ANALYSIS JOB NO. 80-100/03

PURCELL ASSOCIATES ENGINEERS • ARCHITECTS • PLANNERS

DAM UNIONVILLE RES. UPPER DAM.

SECTION 1700' FROM DAM

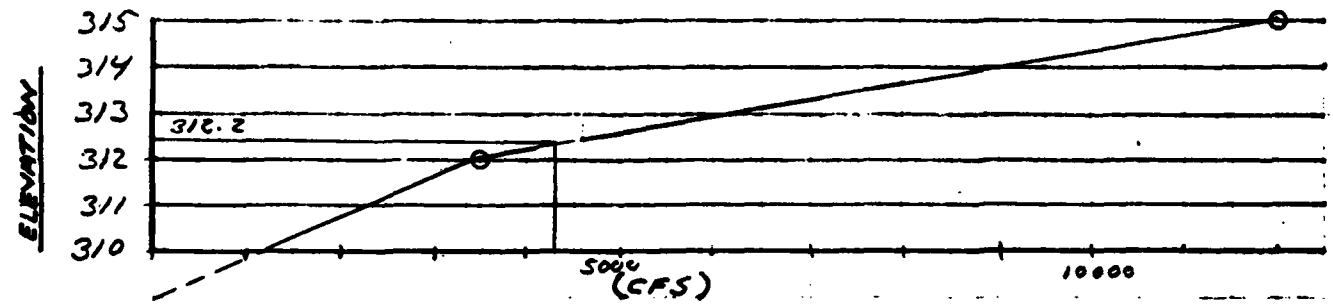
USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ $n =$ .05 SLOPE (S_L) = .04 ft/ft



FULL SPILLWAY Q_s = 100 CFS

Q_{P_1} = 4400 CFS TOTAL STORAGE (S) = 18 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
315	1200	300	4	18000	5
312	380	200	1.9	3500	2
314	910	275	3.3	12000	4



$V_1 = \left(\frac{5.2 + 2.2}{2}\right)\left(\frac{180+0'}{2} + \frac{200+150}{2}\right)\left(\frac{500}{43560}\right)\left(\frac{1}{2}\right)$ = 5.6 AC-FT

$Q_{P_2} = Q_{P_1}\left(1 - V_1/S\right)$ = 3000 CFS V_{AVG} = 6.35

$V_2 = \left(\frac{5.2 + 1.6}{2}\right)(1.5)$ = 5.1 AC-FT

$Q_{P_2} = Q_{P_1}\left(1 - V_{AVG}/S\right)$ = 3100 CFS ELEV = 311.7

DEPTH = 1.7

FULL SPILLWAY & DEPTH = 1'I

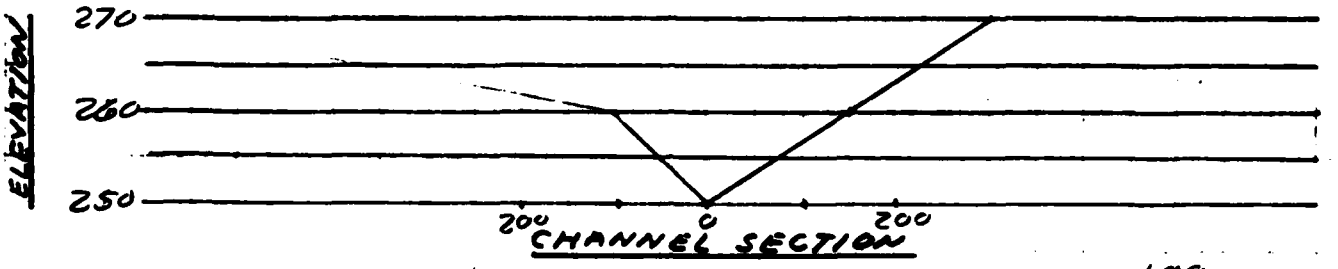
INCREASE DUE TO DAM FAILURE = 0.7

BY RBJ DATE 11/19/80 SUBJECT DAM INSPECTION STUDY SHEET NO. 5 OF 5
CHKD. BY JR DATE 12/5/80 DAM FAILURE ANALYSIS JOB NO. 80-100/03
PURCELL ASSOCIATES ENGINEERS • ARCHITECTS • PLANNERS

DAM UNIONVILLE RES. UPPER DAM

SECTION 2900 FROM DAM

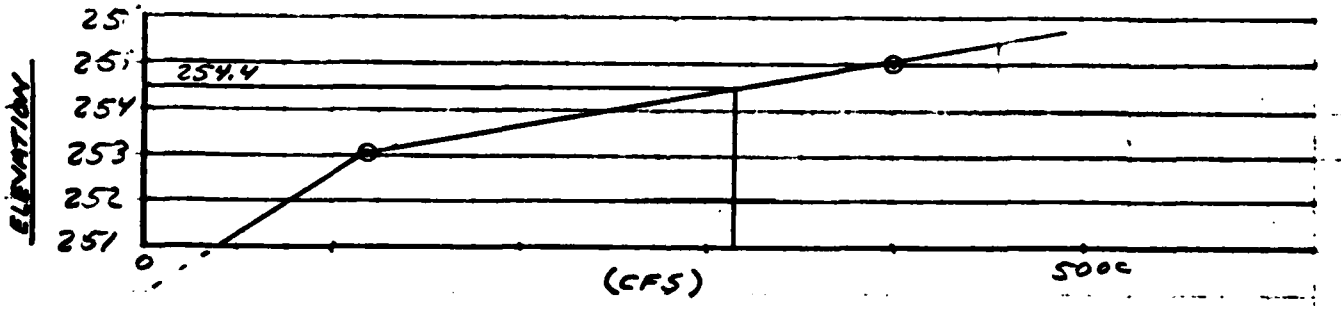
USING $Q = \frac{1.486}{n} A R^{2/3} S_L^{1/2}$ $n =$ .05 SLOPE (S_L) = .05 '/'



FULL SPILLWAY Q_s = 100 CFS

Q_{P_1} = 3100 CFS TOTAL STORAGE (S) = 18 AC-FT

ELEV	AREA	WP	R	Q	DEPTH
260	1250	250	5	24000	10
255	325	130	2.5	4000	5
253	135	90	1.5	1200	3



$V_1 = \left(\frac{7.7 + 4.4}{2}\right)\left(\frac{180+150}{2} + \frac{100+0}{2}\right)\left(\frac{1200}{43560}\right)\left(\frac{1}{2}\right)$ = 9.2 AC-FT

$Q_{P_2} = Q_{P_1}\left(1 - V_1/S\right)$ = 1500 CFS V_{AVG} = 8.3

$V_2 = \left(\frac{1.7 + 3.2}{2}\right)(3.0)$ = 7.4 AC-FT

$Q_{P_2} = Q_{P_1}\left(1 - V_{AVG}/S\right)$ = 1700 CFS ELEV = 253.5

DEPTH = 3.5

FULL SPILLWAY & DEPTH = .5'

INCREASE DUE TO DAM FAILURE = 3.0

UNIONVILLE RESERVOIR UPPER DAM

A. Size Classification

Height of dam = 23.75 ft.; hence below small

Storage capacity at top of dam (elev.396.25)= 18 AC-FT.; hence below small

Adopted size classification: Small

B.i) Hazard Potential

Failure would result in damage to two homes. Failure could result in subsequent failure of lower dam thus increasing downstream damage. Possible loss of more than a few lives.

Adopted hazard classification: High

ii) Impact of Failure of Dam with pool at top of dam.

It is estimated from the "rule of thumb" failure hydrograph, that the following adverse impacts are a possibility by the failure of this dam.

a) Loss of homes 2;
b) Loss of buildings 1;
c) Loss of highways or roads 1;
d) Loss of bridges 1;

The failure profile can affect a distance of 3600 feet from the dam.

C. Hazard Potential Classifications

HAZARD	SIZE	TEST FLOOD RANGE
High	Small	1/2 PMF to PMF

Adopted Test Flood = 1/2 PMF = 1130 CSM

= 1020 CFS

D. Overtopping Potential

Drainage Area 576 Acres = 0.9 sq. miles

Spillway crest elevation = 395.0

Top of Dam Elevation = 396.25

Maximum spillway discharge

Capacity without overtopping of dam = 100 CFS
"test flood" inflow discharge = 1020 CFS
"test flood" outflow discharge = 1020 CFS

RATING CURVE DEVELOPMENT

UNIONVILLE RESERVOIR

UPPER DAM

SPILLWAY

$Q = C\ L\ H^{3/2}$

$C = 2.65$

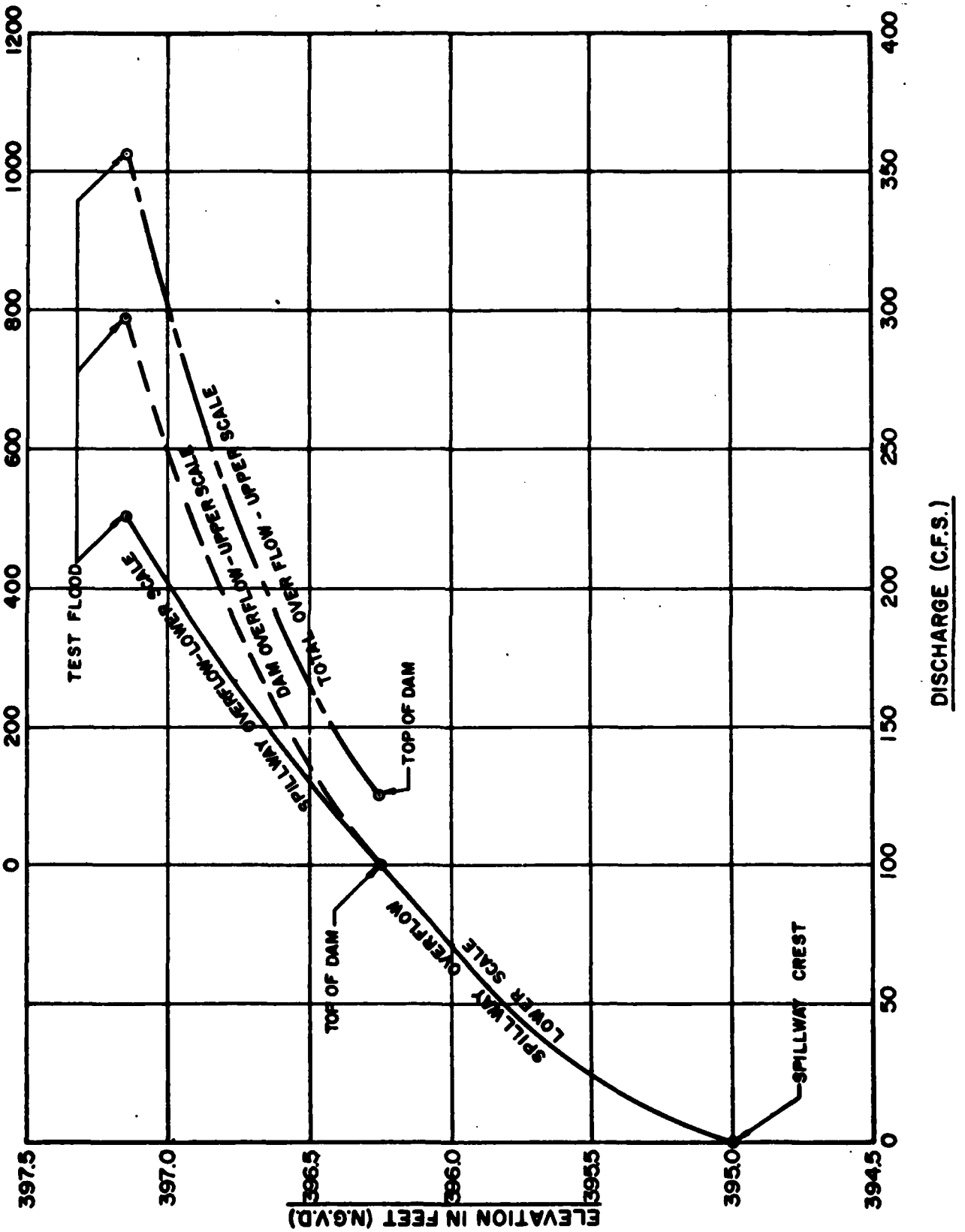
$L = 27$ Feet

16 INCH BLOWOFF

$Q = (c)\ (a)\ (2gh)^{1/2}$

$C = 0.6$

$a = 1.40$ Square Feet



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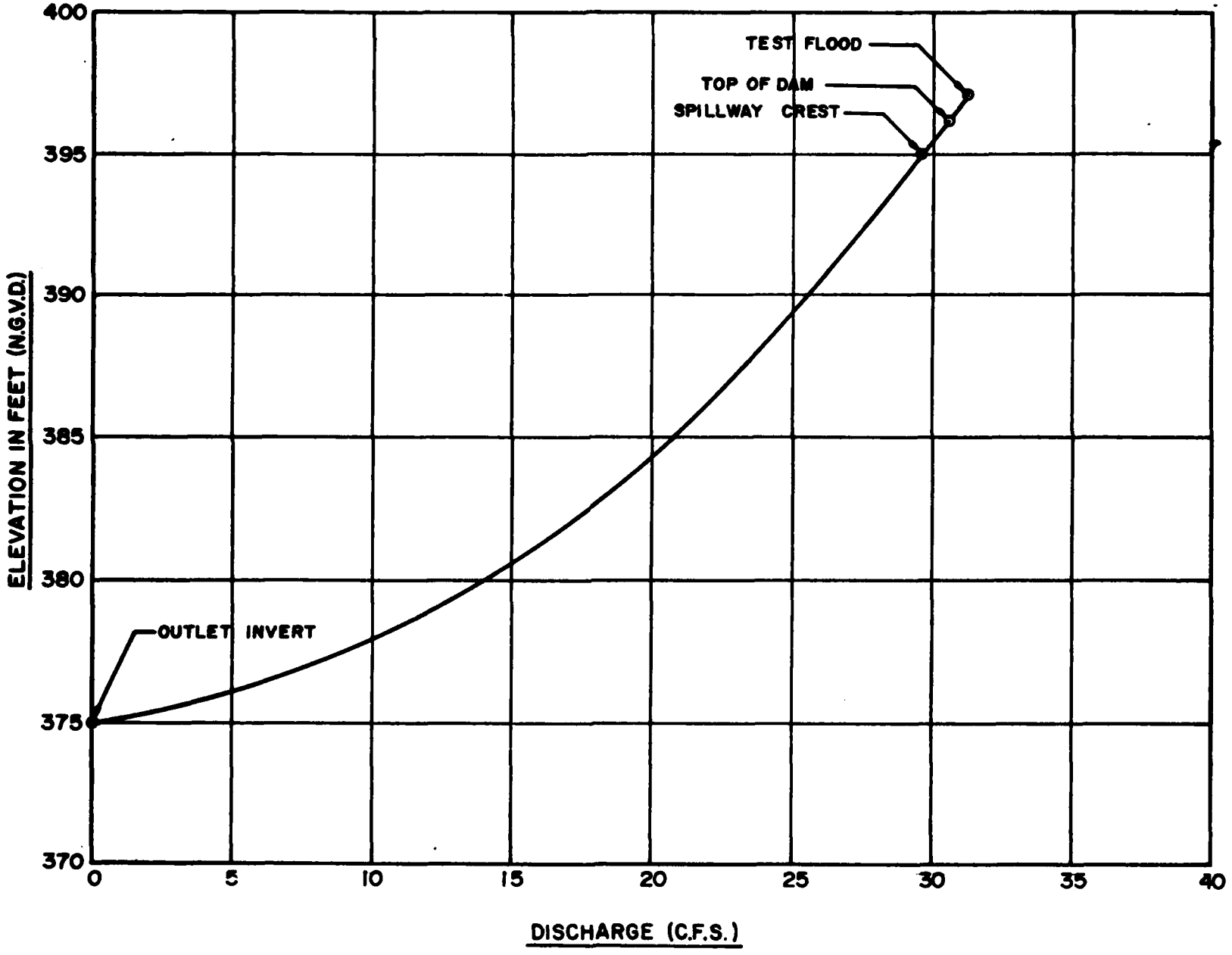
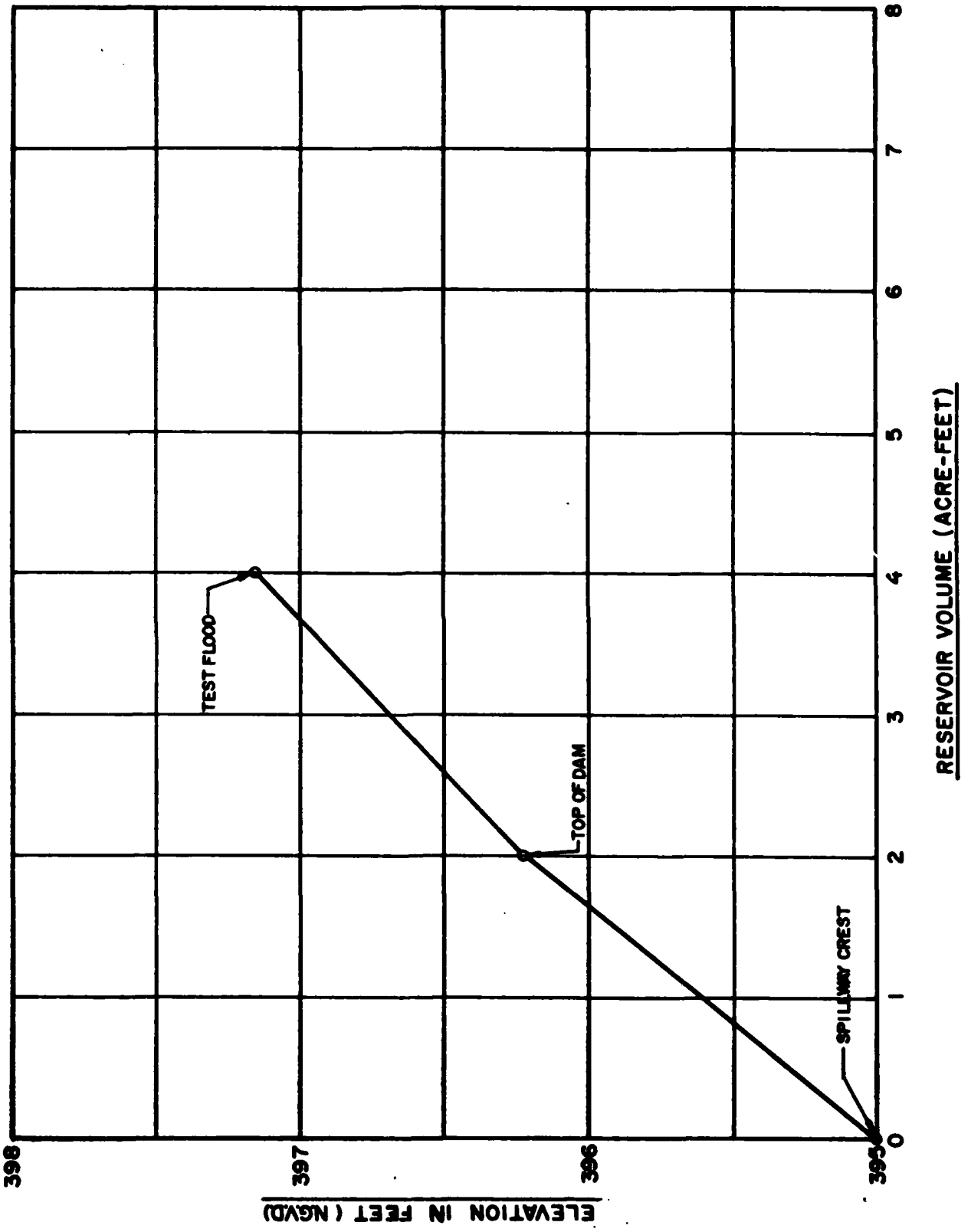
UNIONVILLE RESERVOIR UPPER DAM
SPILLWAY RATING CURVE



D-24

UNIONVILLE RESERVOIR UPPER DAM
16" BLOWOFF
OUTLET WORKS RATING CURVE



UNIONVILLE RESERVOIR UPPER DAM
RESERVOIR STAGE-CAPACITY CURVE

APPENDIX E

INFORMATION AS CONTAINED IN THE

NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME